THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
The Aluminum World — Copper and Brass — The Brass Founder and Finisher
ELECTRO-PLATERS REVIEW

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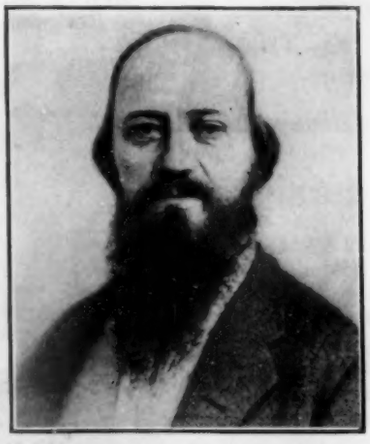
An Eighty-Year-Old Tube Plant

The Story of the American Tube Works of Boston, Mass., with a History and Descriptions of Plant and Products

THE American Tube Works of Boston, Mass., were founded in 1851 by Joseph H. Cotton. They were the first plant in America to manufacture seamless brass and copper tubes. Mr. Cotton was the first also to introduce brass pipe for plumbing and steam installations, more than fifty years ago, with the co-operation of the Boston Master Plumbers. Since that time, the American Tube Works have devoted at least seventy per cent of their capacity to the manufacture of their regular brand, the "ATW Boston" brass and copper pipe. This piping has been in continuous service throughout the United States, Canada, Cuba, Bermuda, Capetown, South Africa and Constantinople, Turkey. The company has always been in the Cotton family and is at this time under the direct control of Miss Elizabeth A. Cotton.



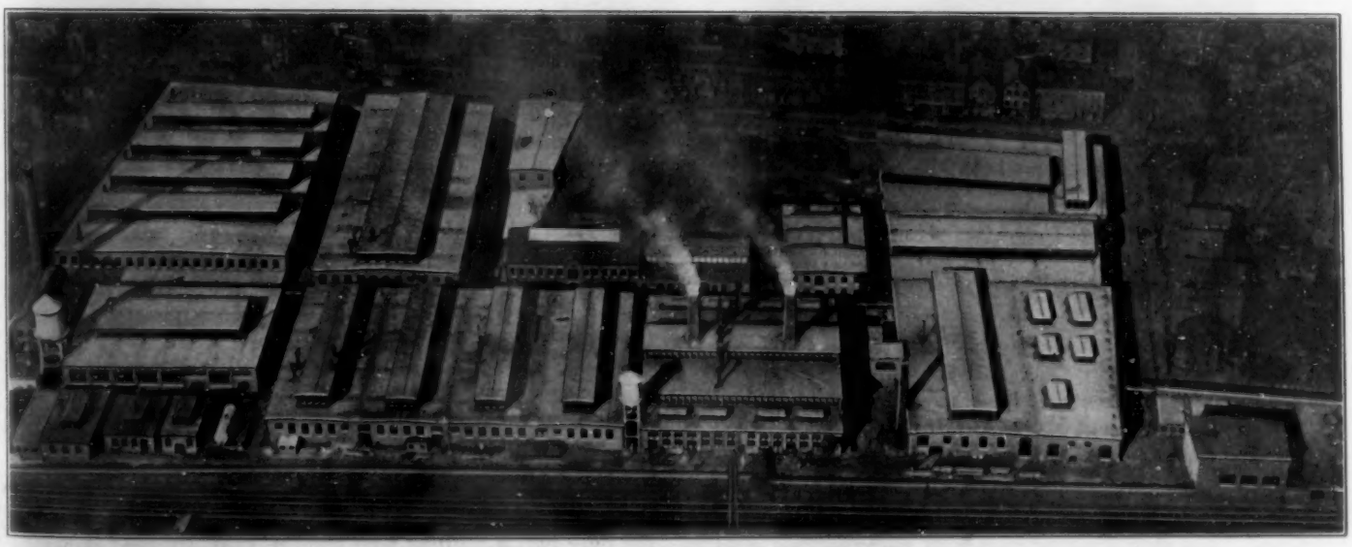
JOSEPH H. COTTON
Founder of the Company

The present officers are:

Walter B. Grant, president.
John J. Dervan, treasurer and general manager.
John J. Stankard, secretary.
Thomas W. Bloomer, superintendent.
William T. D'Arcy, assistant superintendent.

All of these men have been with the company for over 30 years and have worked up to the positions they now occupy. The directors of the company are: E. A. Cotton, John J. Dervan and Walter B. Grant.

In about 1865, the American Tube Works perfected a special process for

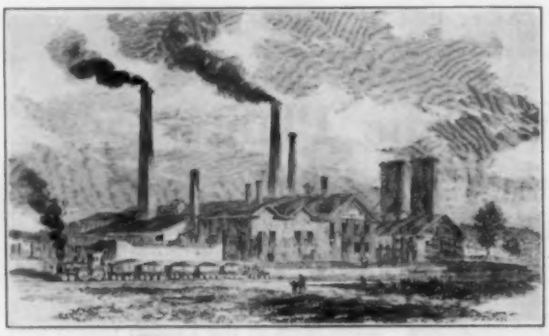


Air View of The American Tube Works Plant, Somerville, Mass.

manufacturing brass pipe of 60 per cent copper and 40 per cent zinc, breaking away from the established mixture of that time, composed of 67 per cent copper and 33 per cent zinc. The installations of 60-40 type of pipe were recently removed from some famous old buildings torn down to make room for new realty developments and the pipe was found to be in as good condition as when originally installed. Among these buildings were the Parker House of Boston (56 years' service); the Waldorf-Astoria Hotel, New York, (40 years' service); the Boston Post Office (50 years' service).

Fully Guaranteed Product

The pipe manufactured by the American Tube Works



Original Seamless Brass and Copper Tube Plant Erected in 1851, Somerville, Mass.

is sold under an absolutely iron-clad guarantee, unique in its completeness.

Plants and Equipment

The plants of the American Tube Works cover between ten and eleven acres on a spur of the Boston & Maine Railroad, in Somerville, Mass., a suburb of Boston. The raw metals used consist only of Calumet and Hecla copper, Horsehead and Granby Select zinc, Straits tin and the scrap made in their own plants. No outside scrap of any description is used. The plant has a capacity of 2,000,000 pounds per month.

For the manufacture of tubes, a separate core plant is

Brass Pump Cylinder Department

in operation which uses a special clay for cores, purchased by this company to the exclusion of all other types. The clay is mixed in a mud mill and then used in the core plant as a binder with the regular core sand. The molding is done altogether by hand with the greatest of care.

Metals are melted and alloyed in batteries of Ajax-Wyatt 60 K.W. induction furnaces. The plant has in addition, two batteries of crucible pit fires with 40 pits in each battery. The crucibles vary in size from No. 80 to No. 300. Coal and coke are used in these fires for fuel.

After casting, the tubes are cleaned, sandblasted and subjected to a most severe inspection. Analyses are taken of each heat poured to check the composition of the metal before further fabricating operations are applied to it.

From the cleaning shop, the tubes go to the mill which employs the special exclusive rolling process used for producing the "A T W Boston" pipe. While the company specializes in the 60-40 mixture, they produce a wide variety of alloys upon specification. For example, this mill hot rolls pipe up to 8 in. in diameter in the following compositions:

60 copper, 40 zinc	90 copper, 10 zinc
85 copper, 15 zinc	70 copper, 30 zinc
94 copper, 6 zinc.	

From this mill the pipe is taken to the draw mills which are divided into four sections. Section 1 draws pipe from 1/16-in. to 2 in. in diameter; Section 2, from 2 in. to 5 in. in diameter; Section 3, all iron pipe sizes; Section 4, the hydraulic mill, draws pipe from 5 in. to 16. in diameter. Pipe can be produced up to 100 feet in length.

In these mills, in which the drawing is done cold, there are Rockwell annealing furnaces, oil-fired and under

One of Battery of Modern Electric Furnaces in Foundry

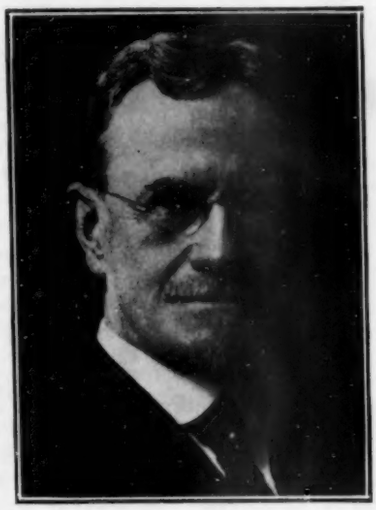
pyrometer control. Pickling tanks are of concrete with a heavy lead lining over the sides and bottom. Overhead cranes are used for moving metal throughout the plant with air hoists for small loads.

It is noteworthy that the practice in this plant is different in many respects from that of most tube mills. For example, brass tubes are not quenched after annealing, but allowed to cool slowly in air. Annealing is done entirely in flat beds; there is no stacking of tubes.

After the final process the tubes are taken to the cutting mill and given a final semi-anneal. They are then tested and inspected most rigidly, almost all of the pipe being put under hydraulic pressure of 1,000 pounds per square inch and some up to 5,000 pounds per square inch.

The pipe is then taken to the straightening machines, straightened and stamped "A T W Boston," each length then labelled with a green trade mark, and cut to lengths specified by a customer or into standard lengths. This method of stamping and labelling has been in existence for over half a century, and the "A T W Boston" pipe is the only pipe which has been stamped and labelled for over

50 years. Special plated pipe is also produced, nickel and chromium plates being provided. A tinning plant is a part of the works where tinned brass and copper pipe is made for special requirements. After subsequent inspections the pipes are packed and shipped.



WALTER B. GRANT
President

Auxiliary departments of the plant include carpenter and box shop for making shipping boxes and general repairs; a machine shop for repair work and special machines, roll grinding, etc., and a hospital room to provide first-aid in case of accident.

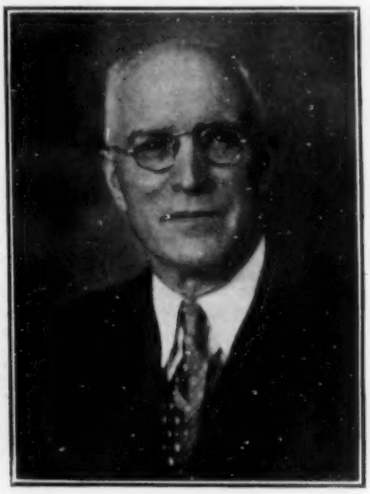
Each department in the plant has definite production standards set for it. Each operation has a standard rate checked up by the cost system.

A feature of the personnel work of the company is that those men who have grown old in its service are transferred to the lighter jobs, and when they have become incapacitated for even this work, they are retired on pension.

Shipping and Distribution

Carload lots in and out of the plant are loaded and unloaded directly from the railroad siding. A considerable local business is done, however, for which special quick service is provided by means of motor trucks. The American Tube Works will ship by truck to anywhere in New England, New Jersey and New York as far as Albany and Troy.

About 70 per cent of the tubes of this company goes to the plumbing trades, the balance being divided between coppersmithing pump cylinders, printers roller molds, paper machinery rolls, sugar machinery, copper service tubes and condenser tubing.



THOMAS W. BLOOMER
Superintendent

Method of Hot Zincing (Galvanizing) Wrought Iron

By WALLACE G. IMHOFF

HOT galvanizing of wrought iron was the subject of a recent inquiry from a subscriber. The answer to the problem may be of general interest and is given as follows:

Wrought iron is usually in the form of pipe, and due to the method of manufacture, it is usually covered with a heavy black scale, iron oxide. If the pipes are covered with oil and grease, they must first be put through a good commercial cleaning bath. After this treatment they are rinsed thoroughly and put into a hot sulphuric acid pickle. The acid strength should be about 4% and the temperature between 150 and 180 degrees Fahrenheit. Particular care must be taken in pickling wrought iron to see that it is not burned or overpickled, as it becomes very porous and pitted.

After pickling, the acid and iron salts should be washed off in a running water rinse bath. From here the pipes are dipped in a hot muriatic bath and placed on a dryer, or are dipped in a liquid flux of zinc ammonium chloride. After dipping in either the acid or liquid flux, the next step is to put them through a dryer, and from the dryer into the galvanizing bath.

The galvanizing bath for wrought iron should be kept at a temperature of about 860 degrees Fahrenheit, but the temperature depends largely on the size and number of pieces put in the bath at one time. Usually the smaller the size and the greater the number, the higher the temperature carried, and the larger the size and the smaller the number the lower the temperature carried. No definite temperature can be given; it must be suited to the work.

The pieces are withdrawn and the coating set in a cooling bath of water. The pieces should be well drained before putting them in the water as the coating will be rough and heavy if this precaution is not taken. From the water tank they go to a storage rack where they are inspected, and if of desired quality are passed on for further operations of testing, threading, etc.

Brass Valve Alloys

Q.—Kindly send me information in regard to the correct formula used for making a standard mixture of red brass from yellow scrap brass turnings, copper, tin, and lead. The metal is to be used for air-tight valves.

A.—It is very simple to use yellow brass turnings in making whatever mixture you desire. First, find out the nature of the yellow brass turnings you are going to use by having analysis made. Yellow brass rod, according to S.A.E. specification No. 72—free cutting brass rod—contains 60 to 63% copper, 2½ to 3½ lead, balance zinc.

A good red brass, in which you could use 1/5 turnings, would be 85% copper, 7 zinc, 6 lead, 2 tin. Make mixture as follows: 20 yellow brass, 73 copper, 5 lead, 2 tin.

A mixture to use 1/3 yellow brass is 80 copper, 12 zinc, 6 lead, 2 tin. Make the mixture as follows: 35 yellow brass, 58 copper, 5 lead, 2 tin.

A mixture to use 50% turnings is 71 copper, 17 zinc, 10 lead, 2 tin. This mixture makes a good brass that will stand up well under water pressure or air pressure, and is good for machining. The mixture is made as follows: 50 yellow brass, 39 copper, 9 lead, 2 tin.

W. J. REARDON

The Metal Producing Industries

A Symposium on Their Record in 1930 and Prospects for 1931.

Copper

By

J. N. McDONALD

Advertising Manager,

Anaconda Copper Mining

Company, New York

THE record copper production and consumption of 1929 obviously could not continue in face of the general industrial curtailment of 1930. World copper production for this year is estimated at 1,760,000 tons. This is 17 per cent less than 1929; 8 per cent less than 1928; 6 per cent more than 1927, and 10 per cent more than 1926. These figures disclose that copper, from a market and use standpoint, is in a much more favorable position at this time than most commodities, and is in a stronger position than recent prices would indicate.

Remarkable progress has been made in extending the use of copper during the past ten years. This period has seen the commercial development of copper radiation for industrial plants, buildings and residences. Brass pipe has come into general use for water lines, and to some extent, for steam return lines. Copper sheet metal work is now regarded as standard construction. Copper and brass are used for a larger percentage of the hardware manufactured.

Ornamental uses of copper and its alloys have also made great strides. A high percentage of commercial buildings erected since 1910 are ornamented with bronze work. This alloy of copper is being extensively used for entrances, store fronts, doors, stair-rails and signs of all descriptions. The counter-screens in banks are mostly of bronze.

Another development of growing importance is the use of thick copper plates for lining vault doors, as the best means of protection against penetration by the oxy-acetylene cutting flame. The protection afforded by copper has been used to advantage in over four hundred vault doors.

A number of the country's leading railroads have electrified divisions or important terminals during recent years. The list includes, the Great Northern, Illinois Central, Pennsylvania, Reading, Lackawanna, Boston Revere Beach and Lynn and the Cleveland Union Terminal. Other roads are considering extensive electrification plans for the near future.

The progress made by radio is well known. Perhaps less evident but of greater importance to the copper industry is the widespread adoption of electrical power throughout every branch of industry. This development requires large tonnages of copper for generating equipment, transmission and distribution. Much improvement has been made in the design and construction of copper conductors, such as hollow conductors and high strength composite cables.

A return to normal conditions in industry generally is bound to result in substantial and increasing demands for copper and its many useful alloys.

The past year has witnessed wide fluctuations in the price of copper. Production was not curtailed in pace with diminishing consumption with the result that surplus stocks increased and the price of copper fell to the lowest price since 1894. The recent world-wide curtailment in production should have a favorable effect on the technical position of the metal, as soon as business conditions tend upward.

It is obvious that present prices cannot continue, as the average cost of producing the world's requirements of copper is greater than the current price. In theory, the price of copper should be sufficient to yield an adequate return on the investments in mines, smelters, refineries and transportation units, and provide adequate compensation for the labor employed. It should be sufficient to permit economic handling of all ore bodies, otherwise higher production cost mines will be forced to close down or to handle only their richer ore bodies. This latter course, from an economic standpoint, would be most unfortunate, as in many cases it would result in wasting normally valuable mineral resources.

Zinc

By

JULIAN D. CONOVER

Secretary,

American Zinc Institute

New York

THE economic depression of 1930 saw a pronounced falling off in the world's consumption of zinc. Demand was affected particularly by the slowing down of building and construction work, in which large quantities of zinc-coated (galvanized) materials, brass products, sheet zinc and zinc paints are normally absorbed, and by the depressed condition of agriculture, which reacted unfavorably upon the sale of galvanized sheets. The world-wide character of the depression was reflected in the sharp decline in exports of galvanized

sheets from both Great Britain and the United States—a considerable factor in this loss of trade being the Far Eastern silver crisis, which drastically reduced the purchases of such products by India.

World production of zinc, which in each of the six preceding years had attained a new high record, fell off in 1930 to the 1928 level of 1,565,000 tons or lower, but was not reduced sufficiently to balance the lower rate of consumption, and unsold stocks mounted steadily throughout the year. Estimates of the International Metel Service indicate that total world stocks, which at the beginning of the year had increased to 130,000 tons, continued to grow to 252,000 tons at December 31st; these figures including American stocks of 74,400 tons at January 1 and 143,600 tons at the close of the year.

The continued oversupply of zinc naturally caused a weakening of the price structure. The London price, which started the year at approximately £20, declined steadily until in December it touched a figure of £13 5s, closing the year slightly above this figure. At the low point the price was equal to the low record for all time, established in 1885, and was equivalent to only 2.87c per pound in the United States (leaving ocean freights and import tariffs out of consideration). The St. Louis price at the same time declined from 5.45c at the outset of the year to a low point of 3.95c in October, and closed the year at 4.125c.

Even prior to the present world depression, a lack of adjustment between supply and demand for zinc had appeared likely as a result of the development of large new mines and the building of new smelters and electrolytic zinc plants in various parts of the world. The economic crisis intensified this condition, and is of necessity bringing about a readjustment. A considerable number of zinc mines and several smelters have already been forced to shut down, and various important projects for enlarging existing facilities or building new plants have been postponed until definite improvement in conditions is evident.

Of the principal zinc producing countries, the United States continues to hold a dominant position, though with production curtailed from 632,000 tons in 1929 to 504,000 tons in 1930, its proportion of the world's total shrank to approximately one-third. Low prices and the inability of producers to dispose of their entire output resulted late in the year in a drastic reduction of output, which fell even below the level of the subnormal consumption, to a rate which if continued for a year would produce less than 400,000 tons. This, together with the fact that consumers were carrying very low stocks and were largely underbought for future deliveries, created a considerably stronger statistical situation; and with the opening of 1931, it appeared likely that any improvement in industries consuming zinc would find reflection in the market for the metal and in absorption of accumulated stocks. Current prices of zinc, both domestic and foreign, appeared too low, in view of known costs of production, to continue for any great length of time.

In appraising the future of zinc, it must be remembered that some of its principal fields of usefulness are as a constituent of other semi-finished materials, such as galvanized steel and brass. Galvanizing accounts for 40 to 45 per cent of the entire consumption of zinc, and although this use has not shown any appreciable expansion in recent years, its possibilities are very great. The ordinary consumer of galvanized roofing sheets, for example, has no realization that their protective coating consists of zinc, nor of the superior service which can be obtained with a moderately heavy coating as compared with the very thin zinc coatings usually supplied. The educating of consumers to these facts and the making available to them of more heavily zinc-coated products, it is believed, would do much to broaden the market for both zinc and steel.

In the pigment field, zinc oxide and lithopone have established themselves firmly, their merits being attested by the steadily increasing consumption. Zinc dust, which makes an excellent priming paint for iron and steel, has not received the attention it merits. The recent development of zinc-base die-castings has opened up a large field to which zinc is particularly adapted by reason of its low melting point, white color and low cost, and which has excellent possibilities of further development. Zinc roofing and sheet metal work, while not extensively used in the United States, are widely employed in Europe.

Zinc in its various forms enters into such a great number of essential materials that conditions in the zinc industry will undoubtedly improve whenever a revival in general business takes place.

Tin

By

C. L. MANTELL

Consulting Engineer

New York

THE year 1930 has witnessed a continuation of the downward trend of prices for tin metal so markedly evident in 1929. During 1929 the highest price of 50⅜ cents was reached on February 5 and the lowest of 38⅜ cents on December 6. The high for 1930, first reached on January 29, was 39¾ cents and the low so far this year was 23½ cents on December 17. This is a record low for the last 28 years and is indicative of the very badly disturbed situation in the entire tin producing and consuming industries.

At the present time the tin plate industry, the largest consumer of tin metal, shows an average operation of tin mills of about 45%. The average rate of operation decreased about 20% from October to November. For the first 11 months of the year the production estimate in thousands of base boxes of tin plate was 34,750 as compared to 36,600 in 1927, 39,925 in 1928, 42,950 in 1929 over the same 11 month period. In recent years the tin plate production has shown a continuous increase, but 1930 statistics indicate a decided falling off and an expected loss for the year of some 20 to 25%. Despite this slowing down tendency, the world demand for tin plate is still rising, but economic conditions at the present time and the depression in foreign countries as well as in the United States have markedly interfered with the normal trend.

The year has seen an immense amount of discussion, a large number of proposals and plans for the stabilization of tin prices, restriction of output, closing of mines, and putting into operation of methods for aiding the tin producing industries in various manners. A number of mines restricted output to a considerable extent where it was

economically possible. One great difficulty in output restriction is that while it is expensive to carry on and a continuance of operation may entail losses at the present prices of tin, it is often more expensive to restrict or shut down. In recent years very large sums have been used for costly dredges and mining equipment, particularly in connection with lower grade alluvial deposits. Some of these mines can operate with thin margins of profit at low prices of tin, and find it necessary to do so in order to satisfy the demands of their stockholders.

Present tin prices calculate to £110 to £120 per long ton. In his survey of the tin industry, Alfred James ("Engineering and Mining Journal," vol. 130, pages 222-224, 1930), shows that Malayan mines may be divided into two groups: those whose costs are below £72 per ton of oxide, and those whose costs are above that figure. In the first class, the mine production is of the order of 24,000 tons of tin oxide running 65 to 70% tin, mined at an average cost of about £52 per ton; in the other mines the total production is about 18,000 tons and the mining cost about £109 per ton of oxide. Average African mines show a cost of about £143 per ton of oxide, Cornish £151, Bolivian £73, and the Dutch mines of Banka and Billiton £74. The average mining cost for 64 Malayan mines is £77 per ton of oxide. To this must be added £27 per ton for realization including transportation of the ores to the smelters, smelting charges and losses, and other items for conversion of the ore into metal; £8 a ton for administration and office charges, and £32 per ton for mine depletion, making a total charge of £144 per ton of oxide. The average issued capitalization of the mines is £332½ per ton, the interest charges of which at 8% add £26½. The average cost of Malayan production thus calculates to £170½ per ton of oxide, or £237 per ton of metal. At present tin prices, the average Malayan mine cannot cover its mining, realization and administration costs, and in addition loses its original capital and all possibility of paying interest or earning profits. With tin at £156 per ton of metal (about 34 cents a pound), the average Malayan mines just cover their mining realization and administration costs but lose both their original capital and all return of interest or profit. Obviously, then, with tin prices at 25 cents a severe distress condition is evident. These prices are the result of extensive overproduction.

Low prices of tin have brought about severe economic distress with subsequent political troubles in Bolivia whose mines contribute a very large share of the world's tin supply. Based on the report of the Patiño Mines and Enterprises, Inc., for the second quarter of 1930, this company, which owns the largest tin mine in the world, ceased to make any profits when the price of tin dropped below 37 cents and the customary allowances for depletion and depreciation were taken into account. Many proposals for restriction of output in various parts of the world, particularly in Malaya, have been set forth and to a great extent have been carried through, not without opposition and lack of cooperation. Many side issues of an economic and political nature interfere with the operation of tin mines and tin properties on a strictly economic basis, which would call for cessation of operations when these were no longer profitable.

In support of the curtailment program among producers, the following groups with a total capacity of almost 3,000 tons of metal a year suspended activities during August and September for the remainder of the year; Kamunting Tin Dredging, Ltd., with five dredges; Pangnga River Tin Concessions, Ltd., with two dredges; Tanjong Tin Dredging, Ltd., with one dredge; Batang Padang Tin Dredging Ltd., with two dredges; Batu Caves Tin Dredging, Ltd., with one dredge; Rantau Tin Dredging Company, Ltd., with two dredges; Taiping Tin Dredging Company, Ltd., with two dredges; South Taiping Tin Dredging Company, Ltd., with one dredge; Puteh Tin Dredging Company, Ltd., with one dredge. In addition, the Mambau Tin, Ltd., with one dredge and the Temoh Tin Dredging, Ltd., with one dredge, have closed down indefinitely. These have an estimated production of 400 to 500 tons. The Kamper Malaya Tin Dredging Company, Ltd., having a capacity of 800 tons of oxide and a mining cost of £45 per ton of oxide, ceased operations for several months during the year and its example was followed by a number of other producers. Some of the leaders in the tin industry expect that perhaps another surgical operation such as the shut downs of plant this year will be necessary during the coming year. The Tin Producers' Association had decided earlier in the year for a 20% curtailment of production and have carried the program through more or less successfully. Floating of financial ventures for new tin properties has ceased and universally throughout the industry only such expenditures are being made for replacement and maintenance as are absolutely necessary.

An interesting side light to the whole situation is the almost entire absence of any propaganda of the type so prevalent three years ago in which tin famines and rapid exhaustion of the tin ore supplies of the world were predicted. It appears now that there are too many tin mines and too many producing properties. Periodically there has been much talk of research. Many articles have been written emphasizing the need of research and investigation for the opening up of new outlets for tin metal. However, there has been no resultant stir of activity along these lines, no opening of new outlets for tonnages of the metal.

With low prices of tin, search for substitutes which had been stimulated by high prices has ceased. In some of its fields of application, such as foil, even at medium low prices tin has been steadily losing ground to its aluminum competitor and both of them are being displaced by cellophane. In tin plate the metal has held its own as the result of the lack of extensive development of some of the expected substitutes. A similar situation holds in the case of Babbitt and bearing metals, the total consumption of which has been markedly reduced as the result of restriction in the automotive industry.

Some improvement has been made during the year to provide better tin statistics which have been previously described as chaotic, due to the lack of agreement by the separate bodies collecting the data as to methods of compilation, material to be included, definitions of terms employed, and the dates of publication. Considerable work remains to be done in providing better and more adequate tin statistics so that the entire industry, from mining at one end to consumption at the other, will have information that is in an understandable form and valuable.

In recent years pewter has again become fashionable and the production of pewter articles has called for the consumption of small but appreciable amounts of tin metal. Cheap silver has in a measure prevented the vogue of pewter from reaching greater proportions. It is thought, however, that the fashion will be merely a temporary one and not of a permanent nature.

Electrodeposition of tin, particularly in connection with electrical refrigeration, was as in 1929 an important minor consumer of the metal. Consumption of tin in the hot dipping of small articles shows the tendency to keep pace with the growth of population, but economic forces have reduced the quantity of metal needed for this work. It is expected that tin chemicals used in the textile industry will show a marked reduction in 1930 over 1929, while the same will hold true for stannic oxide used for enamels.

From the viewpoint of the tin producer, 1930 was a very gloomy year, being disastrous for some of the smaller financially weak operators. Throughout the year the attitude of the entire industry was that of despair, with a very strenuous effort on the part of the more powerful groups by restrictive measures to hoist themselves out of the pits that they themselves had dug. Recovery has been further discouraged by the general low level of economic activity throughout the major industrial countries of the world. The tin consumer, despite the fact that he was able to obtain low priced metal, was markedly dissatisfied with a situation in which one of his major raw materials might suffer from wildly gyrating prices. He as well as the tin producer is interested in the stabilization of prices and values so that the high and low points in the price curve may be leveled off.

Prospects for 1931 do not seem to indicate that improvement can be expected in the near future, inasmuch as large stocks of tin metal are on hand awaiting the decision of consumers to purchase them. With revival of normal economic conditions, tin consumption will increase.

Lead

By

FELIX E. WORMSER

Secretary, Lead Industries Association,

New York

THE lead industries, in common with other non-ferrous metal industries, experienced a poor year in 1930. The price of lead moved irregularly downward throughout the year, beginning at 6.25c per lb. New York, and ending at 5.10c (December 15th). An explanation for this development seems somewhat platitudinous for it was simply the failure of business to absorb even the reduced quantities of pig lead supplied by domestic mines during the year. Pressure of lower prices and mounting stocks caused many lead mines to shut down or curtail drastically. Consequently, production of lead in the United States for 1930 will probably total 620,000 tons, compared with 686,000 tons in 1929. This is the lowest output since 1924.

Lead Consumption Decreased

If we turn to some of the industries using lead we find that they also fared poorly through the year. Mixed metals, lead pipe, sheet, and lead pigments all reflected the drop in business. White lead-in-oil production for 1930 will approximate 83,000 tons compared with 113,000 tons in 1929.

The greatly diversified outlet which lead normally enjoys has not been a source of much strength, even though cable business for the first ten months of 1930 stood up surprisingly well. As a matter of fact it is quite likely that 1930 will show, for the first time in history, the largest unit consumption of virgin lead going to lead-covered cable manufacturing with a total close to that of 1929, i.e., 200,000 tons. For several years it has been a fairly close race between the storage battery industry and cable fabricators for the distinction of furnishing the largest single outlet for lead. Now it appears that the laurel will have to go to the cable industry—at least for 1930.

Few Technical Developments

Metallurgically speaking, there have been few technical developments deserving mention. The practice of double sintering flotation concentrates appears to be growing. This reduces the matte fall and most of the copper in the charge is recovered in furnace dross rather than in the matte.

Blast furnace and sinter fumes are being filtered more intensively by using higher pressures, with a view to increasing bag house capacity, and shaking the bags more frequently.

In the refining of lead the Betterton dezincing process, using chlorine, is coming into more general use. The resultant zinc chloride is refined with nitre and marketed. Debismuthizing with calcium is another development of note. In this process calcium is applied in the form of a lead-calcium alloy stirred into bath at a temperature of 660°F. Bismuth and part of the calcium enter the dross which is then removed and treated for the recovery of bismuth. The remaining calcium is removed from the lead by the addition of chlorine to form a calcium chloride slag. The operation is carried out by using desilverized lead containing .10- .30% bismuth, the products being corroding lead and an enriched bismuth-bearing lead which can be treated by electrolysis for recovery of bismuth.

Slag fuming has been installed at Trail, B. C., to recover the zinc and lead in accumulated slag heaps. The process is similar to that used by Anaconda.

Industrial Applications

So far as the industrial applications of lead are concerned it is interesting to observe that more data were forthcoming during 1930 to show that the new lead calcium alloy developed for cable sheathing promises to find a place in toll cable construction, if not ultimately in power cables as well, although power cable fabricators have not, as a rule, turned to any alloy of lead, preferring common lead for their use. The lead-calcium alloy would naturally displace the widely used antimony-lead combination, if it is finally adopted as standard on toll lines. I understand trial sections of lead-calcium sheathed cable are still being tested experimentally.

During 1930 the use of lead-asbestos anti-vibration mattresses under the column footings of huge buildings made further progress. In fact, the application of this device has been extended to moving machinery such as printing presses and rubber machinery. In some cases other non-metallic vibration dampening substances are used in place of asbestos and enclosed in sheet lead.

An interesting revival of an ancient use of lead occurred in 1930—the manufacture of an all lead casket (hard lead). In view of the renowned corrosion resisting quality of lead one wonders why this metal has not been more widely used for sepulchral equipment other than casket hardware.

Recent British research has tended to show that, contrary to popular impression, the presence of antimony up to 3 per cent is not an objectionable constituent of lead-tin solder but is generally advantageous, although it is objectionable when soldering zinc or galvanized iron.

A stream line fitting for copper tubing using a solder film was placed upon the market in 1930.

Aluminum

By S. K. COLBY

Manager of Sales Promotion,
Aluminum Company of America

A NUMBER of outstanding commercial developments have taken place in the aluminum industry during the year 1930. While these have created many new uses for the metal, they have not been of sufficient magnitude to offset the decreased demand for aluminum in many of its older fields of application, and as a result, the output will show a decline for the first time since 1921. This is not at all surprising in view of the fact that 38 per cent of the annual output of new metal generally goes to the transportation industry and in both the automotive and aeronautical fields there has been a decided decrease in production. It is, however, gratifying to note the important part research and development work have played in minimizing the industrial depression.

Possibly the application of aluminum in architecture and interior decoration has been the most productive of this metal's newer uses. At the present time, approximately 3 per cent of the annual output of aluminum is consumed by the building trade. While this is but a comparatively small percentage, the developments in both architecture and interior decoration have progressed much more rapidly than in many of the older and better established fields.

In point of tonnage, the largest single architectural application of aluminum is in the Empire State Building, New York City. When this building is completed approximately 850,000 pounds of aluminum will have been employed in the mooring mast, the store fronts, the marquises, the elevator doors, and the 5,704 spandrels.

The Research and Engineering Building of the A. O. Smith Corporation, Milwaukee, offers a prophetic vision of new building materials and the future use of them. With the exception of the limestone piers at the corners, the elevations of this seven-story laboratory are constructed entirely of aluminum and glass. By the use of metal, it was possible to close in the building in approximately one-fifth the time required with masonry. This again reflects the energy and forethought of modern industrial research.

Aluminum furniture had been on a fair production basis for more than three years, but during this time, it was manufactured by only one company. The past year has witnessed an expansion in the aluminum furniture business, and at the present time, three other companies have entered this field. It is interesting to note that the contemporary designs for aluminum furniture and furnishings are more distinctive of metal than of wood; not only is the furniture designed along metal lines but it is finished in solid colors or in the natural color of the metal. This is in direct contrast to the first development.

The use of color on metal parts is becoming increasingly popular and adds materially to the effectiveness of aluminum as a decorative material. Color finishes are now successfully applied by both chemical and electrochemical processes and in the not too distant future it is reasonable to assume that vacuum cleaners, radio cabinets and other metallic objects will be dressed in a new coat of color!

The use of aluminum in the transportation field has always been one of this metal's principal applications. The completion of a structural mill for producing channels, angles and zees in the larger sizes has enabled the transportation engineer to further the application of aluminum in the rolling stock of railroads and street railways. The aluminization of truck bodies—a development begun in the Fall of 1928—has been extended to both gasoline and milk tank trucks and trailers. With aluminum tank cars transporting various chemicals and food products, it is apparent that the aluminization of tank trucks has just begun. There are many food products and chemicals that can be carried in aluminum tank trucks.

The adoption of a new low expansion aluminum piston alloy by several of the leading manufacturers of airplane, automobile, bus and marine motors took place during 1930. This new alloy has a much lower coefficient of expansion than the older aluminum piston alloys, better thermal conductivity and superior bearing qualities; it is also lighter. Because of this desirable combination of properties, pistons in this alloy can be fitted with closer clearances, form less carbon and have a greater resistance to wear.

Enterprise, which so decisively defeated Shamrock V for the America's Cup last September, carried a mast built entirely of the strong aluminum alloys. A great deal of the credit for the American yacht's victory has been given to this tradition smashing spar which the designer of Shamrock V has referred to as "the greatest engineering feat ever attempted in developing racing yachts."

While there has been a marked decline in the amount of aluminum employed in aircraft during 1930, as a result of the aircraft manufacturers entering the year with a surplus stock, the ZRS-4 represents an interesting development. This massive dirigible, which is 23 feet wider and 80 feet longer than the Graf Zeppelin, will require approximately 125,000 pounds of aluminum.

Although it is common to associate weight reduction primarily with the transportation industry, there are many instances in which aluminum has been employed in the machine tool industry to reduce the weight of movable parts. Overhead travelling cranes have also been fabricated from strong aluminum alloy structural shapes. These cranes, with capacities ranging from a few thousand pounds to 50 tons, weigh approximately 40 to 60 per cent less than similar cranes built in the heavier materials.

Heretofore, practically all of the aluminum used for transmitting electrical energy has been in the form of bare conductors. Its use for this purpose is well known to the electrical industry, and within the past ten years, more than 250,000,000 pounds of aluminum have been employed in the production of overhead transmission lines. Recently a large producer of wire and cable has announced a varied line of insulated aluminum wires and cables for both overhead and underground systems. The addition of insulated aluminum conductors will enable the electrical engineer to employ the economic features of aluminum in a much broader field.

Experimentation of several years duration, undertaken by a number of the larger oil companies, demonstrates that aluminum and its alloys are highly resistant to attack by hydrogen sulphide. Since this gas is given off by certain crude oils, particularly those coming from the limestone areas, the deterioration of equipment from hydrogen sulphide has been a matter of grave concern. The generally depressed condition of the oil business and the experimental nature of the work with aluminum have combined to restrict tonnage actually consumed in the petroleum industry. It is expected however, that the future will see a development of this field to worth while proportions.

Woven wire fence and barbed wire have been fabricated from the strong aluminum alloys and placed on the market. Aluminum screen cloth is now a commercial product. These commodities, as well as corrugated roofing, point towards decreased maintenance and greater durability. They belong to the Rustless Age.

Early in 1930 the Aluminum Company of America erected a new central research laboratory at New Kensington, Pennsylvania, in order to further its developments in this field. The new plant, which houses 150 aluminum metallurgists and chemists, has used much of the metal with which these scientists work and is a most appropriate monument to the part research has played in broadening the scope of aluminum in commerce.

A long felt want in technical literature has been an authoritative work covering all phases of the aluminum industry. During the past year a two volume book, "The Aluminum Industry," by Edwards, Frary and Jeffries, has been published.* These books describe not only the production of the metal but the fabricating processes as well and are a fitting tribute to the activities of an industry whose commercial history is not even 50 years old.

Nickel in Non-Ferrous Alloys

By A. J. WADHAMS

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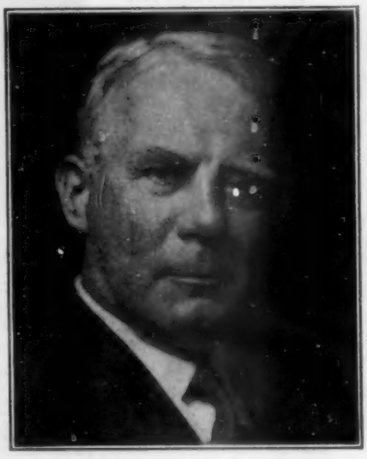
New York



Photo, Blank-Stoller, Inc.

ALTHOUGH the tonnage of nickel consumed in 1930 declined with that of other raw materials, this last year nevertheless witnessed an increasing diversification of the applications of the metal to the world's industrial life. The industry continued its policy of development of materials and of markets. Experimentalists and engineers extended their researches into the properties of nickel alloys, consolidating that fabric of data from which the technologic advances of the near future must draw their inspiration. It can be safely said that the nickel industry is in an excellent position to benefit quickly and widely by any improvement in the general business situation.

The industry's outstanding feature of the year was, perhaps, the rapidly increasing use of corrosion resistant steels of the nickel chromium type. It is rather significant that in a period of curtailed industrial activity the tonnage of alloys of this type produced has steadily increased. The widespread acceptance of the so-called "stainless" alloys by the public and by the engineering profession, and their consequent adaptation to a multiplicity of applications, has led some authorities to predict that the next decade may well be known as the "stainless age", just as the past decade has been called the "alloy age".

Further expansion of nickel tonnage may be expected in the petroleum field, which is beginning to accept, in addition to the stainless steels, certain nickel-bearing cast iron alloys of good corrosion resisting qualities, and also pure nickel strainers for the bottom of the deep wells.

Stainless steel appears to have intensified the demand for white metal, a demand which has been promoted for many years by Monel Metal. The place which this nickel alloy has established for itself, by reason of its warm white color, corrosion resistance, toughness and other desirable qualities, can best be indicated by the fact that tonnage in 1930 fell off only slightly from consumption in the peak year, 1929. Plans for further expanding its field of usefulness and for intensive development of those fields in which it has found acceptance have been spurred as a result of this extraordinary performance in a year when the consumption of other metals was materially reduced.

It was but natural that the popularity of white metals for architectural applications should be reflected in the home. More and more articles of household use—washing machines, drainboards, kick plates, laundry chutes, etc.—will be made of Monel Metal. The custom-made Monel Metal sink, for example, has proved so popular that a new sink, standard in design and in manufacturing method, is being developed that will be sold in price competition with enamel sinks.

While Monel Metal held its own in its fields of greatest use—commercial laundries and food service equipment for hotels, restaurants, hospitals and other institutions—it has gone out into new fields dependent upon mass production methods, such as the frozen food industry.

There is evidence that the practice of adding nickel to brass and bronze castings to improve their mechanical properties and retard lead segregation is growing. Sales of primary metal to the non-ferrous foundries have not been particularly large, as intermediate alloys and white metal scrap are still used extensively for making the nickel additions. However, the available supply of suitable white metal scrap has been dwindling rapidly and any increased activity on the part of non-ferrous foundries should be rather promptly reflected in increased sales of primary nickel either direct or through the manufacturers of addition alloys.

Many of the fundamental problems in connection with the use of solid nickel silver for plumbing fixtures and builders' hardware for architectural applications and joiner hardware for marine applications have been solved; and the adoption of plumbing fittings of this material for the buildings being constructed in connection with the Federal Building program has given considerable impetus to this development. A number of the leading monumental type buildings constructed during 1930 were equipped with plumbing fittings of solid nickel silver, and more widespread use is indicated this year. In the marine field, where materials of this type have been used for joiner hardware for a number of years, general specifications for nickel content have been revised upward until 20 per cent is quite generally used. Many of the larger ships now on the ways will be equipped with plumbing fittings and joiner hardware of this permanently attractive material.

Use of ferro-nickel alloys of the Permalloy type, containing up to 78 per cent nickel, to counteract the capacity effect of long distance transmission lines, now is quite general. Another alloy of this type, containing 45 to 50 per cent of nickel, has been used with marked success for

* Reviewed in THE METAL INDUSTRY for July, 1930, page 346.

audio transformers for radio receiving sets, and the use of a similar product is being considered for the construction of lighting and power transformers.

Cupro-nickel condenser tubes, containing from 20 to 30 per cent of nickel, have been used for some time with marked success by a large majority of the foreign navies. Results obtained by the extension of their use, particularly in Great Britain and France, to steamer and tanker construction, have demonstrated that the service rendered more than compensated for the slight additional cost. In this country cupro-nickel condenser tubes of 30 per cent nickel content have been specified for reconditioning five liners for the Roosevelt Line. One of the prominent nonferrous rolling mills has received an order for approximately 140,000 pounds of copper nickel tubes for the condensers of these steamers, and an additional order for approximately 204,000 pounds of 30 per cent Ambrac tubes, which are similar in type to the 30 per cent cupro-nickel tubes, for the condensers for two new liners now building for the United States Lines.

Heat resistant alloys containing from 5 to 80 per cent of nickel have become standard materials for heating elements for electrical thermal equipment, both industrial and domestic. Rapid expansion in the use of electrical energy for thermal operations has naturally been reflected in increased nickel consumption by the producers of alloys of this type. Consumption of nickel for the production of heat resistant furnace parts, containers and similar industrial applications fell off sharply during 1930, due to curtailed operations in the fields where castings of this type are most widely used, but a steady expansion of the use of thoroughly proved alloys of this type may be expected as conditions return to normal.

Ni-Resist, a nickel-copper-chromium cast iron, containing up to 25 per cent of these elements, and which in addition to having good heat and corrosion resistant properties, is non-magnetic and of high electrical resistivity, was announced at the 1930 National Metal Congress. Considerable interest was aroused, and sample installations are undergoing test in the principal industrial fields.

Adoption of more enduring standards by the large users of electroplated equipment, and the development of the technique of plating along scientific lines, has resulted in a vastly improved quality of nickel plate. There is a decided trend toward white metal trim as evidenced by the popular chrome-on-nickel finish, and as the type of coating now available is both durable and attractive, consumption of nickel should increase materially with returning confidence in the performance of plated ware. In this connection it is interesting to note that practically all the chromium plate now produced consists of combinations of layers of copper and nickel with a flash of chromium superimposed. Almost a thousandth of an inch of nickel and copper are used with but a few millionths of chromium.

About 23 countries are using pure nickel coinage, and this use is constantly expanding. The tonnage involved is already appreciable, and from present indications should increase rapidly.

The use of nickel in foreign countries is spread over the whole field of ferrous and non-ferrous applications. There is promise that when the general industrial situation improves abroad there will be the same general type of expansion that we confidently forecast for the United States and Canada. Establishment of bureaus of information on nickel in the principal continental centers and in England has enabled the nickel industry as a whole to determine more accurately the pulse of the international nickel demand.

The nickel industry now is geared to meet any demand that can be comprehended at this time. It is to be noted that the continuing program which was initiated some years ago to provide adequately for the nickel industries was substantially completed during 1930. A comprehensive review of the entire development appeared in the November 10th issue of the Engineering and Mining Journal. Completion of this program was a major development of such far-reaching importance that no review would be complete which did not mention it as such.

The Precious Metals

By

G. H. NIEMEYER

Vice-President, Handy and Harman

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Gold—There was a material reduction in the use of gold in the arts and industries during 1930. The amount used by the optical industry compared favorably with previous years. The demand from the dental industry was below that of 1929, but there was a material falling-off in the consumption of gold for jewelry.

There was a pronounced reduction in the output of medium-priced jewelry, and although a very satisfactory business was done in costume jewelry and novelties, most of these products were made of rolled gold plate. The use of colored golds was extended in all fields and there was a particular demand for "pink" gold in the optical trade.

Silver—From the figures now available, the world's production of silver during 1930 totaled approximately 243,700,000 ozs. compared with 260,900,000 ozs. in 1929. The United States output is estimated at 50,400,000 ozs. as compared with 61,200,000 ozs. last year. Mexico produced 105,700,000 ozs. as compared with 108,700,000 ozs. in 1929. Canada produced 26,200,000 ozs., against 22,400,000 the year before.

The consumption of silver in the arts and industries in the United States and Canada during 1930 is estimated at 29,500,000 ozs., which is about 20% below the fine silver ounces used in 1929. The three principal silver-using industries showed decreases in consumption, estimated as follows: Sterling silver ware 25%, silver plated ware 30% and the chemical and photographic industries 10%.

The market price of silver reached unprecedented low levels during 1930. The highest New York official quotation was on January 2nd, 46⅞c.; the lowest price during the year was on December 30th, 30¾c. The average New York official price for the year was 38.154 cents per ounce.

Platinum Metals

The latest figures on platinum imports for 1930 issued by the Department of Commerce are for the period ending October 31st.

Imports of platinum were 87,882 ounces compared with 95,928 ounces for the same 1929 period.

Iridium imports were 4,675 ounces last year compared with 3,502 ounces in the preceding year.

Palladium showed a decline, the figures being 17,174 ounces in 1930 against 21,064 ounces in 1929.

The platinum market last year declined due to severe competition among producers and generally depressed business conditions. The jewelry trade was naturally the chief sufferer from the depression, and the amount of platinum consumed was less than in 1929. The low prices, however, helped to increase the use of platinum in the essential industries. It is generally understood that the various producers of platinum throughout the world came to an agreement in the fall of 1930, the result of which was a strengthening of the market at prices slightly above the low for the year.

The immediate outlook is for steady prices, and it is thought that any improvement in trade conditions would be reflected by an advance in the price of the metal.

The palladium market was weak for the greater part of the year, but in December a fairly good demand tended to strengthen the price slightly. There is at the present time no indication of further weakness in this metal.

Iridium fluctuated both up and down during the year, but closed at approximately the opening quotation. The market appears fairly steady, but an improvement in demand would be necessary to cause any rise in quotations.

Platinum opened at $60 an ounce and declined to $27 an ounce in September. The present market is about $36 retail. The opening price of palladium was $34 an ounce. This metal declined to about $18 an ounce, and closed at approximately $19. Iridium opened at $180 and declined to $140 in April. It then advanced sharply to $250 in June, from which quotation it has steadily reacted to close at approximately $180.

Secondary Metals

By

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IT is not difficult to know where to begin in writing up a review of this interesting and important branch of metallurgy, but the importance of secondary metals as an economic factor is being brought so much to the fore that it is very difficult indeed to know where to stop.

Particularly is this so in looking back over 1930. Development in technology has comparatively little to show that is spectacular or of immediate importance; price and tonnage fluctuations have occupied the stage.

General Technology

The metallurgist or physical chemist may have failed to produce non-ferrous alloys that meet the simultaneous requirements of high-temperature, strength and corrosion resistance demanded by the chemical or power engineer but he is continuing to turn out and publish more information than can be immediately absorbed by his fellows. Thus during the past year we have seen a number of papers released on both theoretical as well as practical metallurgy which represent marked progress along lines such as the effects of impurities and gases in metals, furnace atmospheres and the addition of small amounts of added metals. These are certainly of interest to anyone refining secondary metals and alloys or using the products of the refiner, smelter, ingot or alloy manufacturer.

Prejudice still is all too widespread against the use of alloys, for working, casting, soldering, etc., made wholly or in part from secondaries. Nevertheless, the prejudice is being broken down and more and more the engineer (and even the fellow metallurgist) is coming to realize that alloys or metals of virgin origin are not necessarily a guarantee of successful application.

Even a virgin metal must needs have passed through a refining process and the effects of the presence of the original impurities often are more to be guarded against than of those common to secondary metal. An impurity is an element in the wrong place or combination. Sometimes, that which we call an impurity may perhaps be beneficial; increased recognition of this fact, and instances and examples are accumulating, should in turn work for still more economic handling of recovered metals. The overcoming of this prejudice, therefore, lies in proper refining for the metal on the one hand and proper handling thereafter on the other.

Romanof and Thieme with Paulson and others discussed this at the 1930 Round Table of the American Foundrymen's Association and pointed out that the purity of the metal and foundry and shop practice, to say nothing of the purpose desired, must be correlated.

Allied to this phase of secondary metals is the marked progress being made by The Non-Ferrous Ingot Metal Institute in simplifying and standardizing compositions, following a comprehensive survey made by them and reported to the American Society for Testing Materials at the annual meeting in June. At the latter meeting, revised specifications for copper-base alloys in ingot form were accepted as Tentative and at the September meeting of the Non-Ferrous Ingot Institute were formally approved. Also, a research fellowship was established by the Institute at the Bureau of Standards.

So too, we find the Aluminum Research Institute, composed of the leading secondary aluminum alloy smelters, initiating among other progressive measures, a comprehensive investigation of methods of analyses in order that scrap aluminum may be more efficiently and economically employed, the limitations of certain impurities and added constituents more closely ascertained, and the product still more closely controlled.

During the year this Institute also drew up and approved new aluminum scrap specifications which were in turn presented at the March meeting to the Metal Division of the National Association of Waste Material Dealers for approval. A special committee was appointed by the latter to consider the questions raised and report at

the next annual meeting. Indications are that they will be accepted with minor changes.

At the same meeting, the report of the Committee on Definitions, involving certain terms used in valuing scrap metal was accepted by The National Association of Waste Material Dealers and the practice of selling battery plates on sampling and analyses was also recognized as standard, but optional.

The formation was also announced during the year of a White Metal Institute with headquarters in New York.

Further recognition came in July when the statistical and price features of the old "Engineering and Mining Journal" were segregated into a separate weekly, divided into Primary and Secondary Metal Sections.)

Survey of Secondary Copper

Somewhat later in the year, the interest of the government in the form of the ever alert Department of Commerce, as well as that of others having been brought to a focus, it was decided to initiate a survey to be conducted under the able leadership of Dr. J. W. Furness, Chief of the Minerals Division of the Bureau of Foreign and Domestic Commerce. For the present, the survey (which will possibly have the co-operation of the Copper & Brass Research Association) very wisely and quite obviously to those who have made a study of the subject, would be confined to secondary copper, a man's sized job in itself.

The subject of such a survey was first brought up shortly after the attention of metallurgists had been focussed on the tremendous importance of secondary metals at the symposium initiated by The Institute of Metals Division of The American Institute of Mining & Metallurgical Engineers held in 1928. Recognition of the need for such a survey has been coming rapidly to the fore since then and it is not unreasonable to suppose that the unsatisfactory condition of the copper market has aided in bringing the subject to a head.

The writer in the review for the year 1929 in the January issue of THE METAL INDUSTRY discussed certain of the factors involved and in the absence of such data ventured a prediction based upon phenomena well-known, of course, to a few similarly in as close or closer contact with tonnages and flow, but not apparently appreciated by the many. Predictions, however, do not always come out well. Due care and much thought is being taken to see that the purpose and scope of the survey is carefully planned as the difficulties are all too well recognized.

As it involves a fewer number and the primary refiners consuming large quantities of scrap, the secondary smelters and ingot makers, the large wrought and cast brass manufacturers and the large dealers and exporters are possibly more aware of the advantages to be gained than the industries producing or the rank and file of small dealers,—the questionnaire will, for the present, be confined chiefly to the first group.

The purpose is to obtain data as to where it comes from; to whom does it go; by whom is it used and in what tonnages.

The question, of course, is a basic one with the primary producer but it can no longer be and is not ignored by the progressive consumer as it has a marked bearing, aside from technology and price, on the other commercial aspects such as uses and the conservation of our natural resources.

It is hoped that additional tonnage and other information as to geographical as well as industrial origin may be made available and also the amounts produced of each important class of scrap. In fact the difficulty in planning the survey has been more that of confining the questions to be answered, to those of most importance not only for the reasons mentioned above, but also as best indicating trends.

For instance, to those interested in predicting the turn of business, and who is not, it would have been interesting if figures had been available for the last three years showing the monthly receipts at the refineries of brass skimmings and ashes; a product which is almost certain of having that ultimate destination and thus not so susceptible of duplication of figures as many other types. Indicative, too, of the state of business if tonnage, not percentage of copper contained, is used; a study of the latter is interesting in itself from the metallurgical as well as commercial angle as a measure of the increased efficiency of the secondary smelters and large industrial plants having their own foundries and concentrators.

The inauguration of such a survey is, therefore, one of the most important developments that the industry has seen not only this year, but for some years.

The Institute of Metals was again responsible for the presentation of several papers of particular interest to producers and users of secondary metals and products. So too was the British Institute of Metals. A number of references including a bibliography is published in the January, 1931, issue of "Mining and Metallurgy" under the title "Non-Ferrous Metallurgy in 1930" and prepared by the capable Papers and Programme Committee of the Institute of Metals (A.I.M.E.)

To the associations already mentioned must be added that of The American Society of Mechanical Engineers which has appointed a committee to draw up a Dictionary on the Disposal of Waste Materials, including metals.

Copper

Among the individual metals there is little that is new or of especial interest if one excepts, of course, the inordinately heavy tonnages of copper received at the refineries the first six months and the extremely light tonnage the last half of the year.

Additional refineries are becoming interested in purchasing secondary copper either of the high grade type only or all types. In the middlewest, the electrolytic refinery built solely to refine scrap copper and brass and to recover and utilize tin and lead as well to the fullest extent possible came into full production and has already increased facilities and equipment. This development is being followed both at home and abroad.

Quite naturally, due to the business depression, the average copper content of material received at refineries and smelters will probably show a marked fluctuation for the year due to the elimination of some of the lowest grades by both lessened production and the low price of Copper, and the unduly high proportion of public utility grades; replacements in that industry apparently were not so adversely affected so production kept up fairly well, but the foundries' and ingot makers' requirements were less.

The year closed with many dealers accumulating or else out of the market, and receipts at refineries low.

Lead and Antimony

While here too statistics are not available, shipments of battery lead plates and cable lead of the power type have not been affected as has copper. The valuation of battery lead on the basis of sampling and analyses continues to increase, both wet and fire assay being used. A compilation made recently by our organization covering a period of three years and over five hundred carloads handled by the same methods shows conclusively the seasonal variations in moisture and a tendency for the lead

content to be dropping slightly, with antimony remaining about the same. Winter shipments will average about 6.5% moisture and summer about 4.5%. Lead-antimony on the dry basis averages close to 83%; excessive moistures ranging up to 13% in unusual cases, will bring down proportionately the figures for the original basis. High moistures call for unnecessary freight and refining charges and cause dissatisfaction. They are caused by insufficient drying or seasoning and/or excessive battery mud content.

A development of more interest for the future than the present has to do with the substitution of calcium for antimony in cable sheathing. However, the hard lead caskets now being commercially produced will probably not come back on the market in our time!

Tin

Continued progress has been made in the recovery of this valuable metal. As we are dependent upon foreign sources for our supply of the virgin metal, this is of particular interest but details of the processes are not yet as a whole available for publication. On the commercial side as well, it is noted that a number of dealers have this year installed small kettles for the remelting of white metals, mergers and absorption of some of the smelters having opened that field for local exploitation. It might be added that an additional amount of casting copper and red brass is also being produced in this manner from secondary metal.

A large copper refinery and lead smelter is now actively soliciting tin ashes, drosses, pastes and residues of both chemical and metallurgical origin and this will probably affect export shipments to England and Germany even more this coming year. Imports have been received this year of tin and also copper bearing residues containing silver and small amounts of gold.

Zinc and Cadmium

Little can be said of zinc as the low price of the metal and the continued depression has not encouraged, for instance, the recovery of zinc oxide from brass smelting operations. Still installations increased.

Cadmium residues are beginning to come on the market.

Nickel

Continued increase in the uses of nickel have kept up the interest and the scrapping of radio tubes makes available a convenient form for small additions to other alloys. Continued confusion in differentiating between Monel nickel silver and steels of the Nirosta type still is giving trouble to the dealer. On the other hand, the dealer not technically trained finds it difficult to understand why the copper refinery must penalize for a metal otherwise in such demand.

Aluminum

This metal has been discussed under general technology. The industry has been affected adversely by the recession in automobile and other industries.

Several innovations that will affect secondary aluminum of the future, however, are:

a—The commercial production of insulated aluminum cable with or without a steel strand,

b—The addition of titanium to certain automotive type alloys, and

c—The addition of chromium and molybdenum together to the hardware type.

The growth of the aluminum die casting industry, with that of zinc, is a cause of concern to secondary metal users of the red metals.

Precious Metals

Shipments of sweeps, solid and platers' scrap, polishings, and other forms of recoverable material have shown a change both in tonnage, values and character due to the decreased demand for medium priced gold jewelry, the increased production of the cheap costume type and the lower price of silver and the platinum group. In the pen industry synthetic osmium and ruthenium alloys containing base metal are replacing native iridosmium grains.

Some of the scrap of the gold and/or silver type is so low grade that a fair proportion was shipped this year as jewelry brass to copper refineries.

Literature

The year 1930 saw innumerable articles and editorials, many of only passing interest however, on or affecting Secondary Metals not only in the technical press and societies, but in the financial columns of the newspaper. Of the many books published on metals mention should be made of:

Secondary Aluminum—by R. J. Anderson.

The Aluminum Industry—by Edwards, Frary and Jeffries.

Metallurgy of White Metal Scrap and Residues—by E. R. Thews.

Tin—by C. L. Mantell.

and the Transactions of the societies previously mentioned.

Distribution of Aluminum

TRANSPORTATION uses the largest quantity of aluminum consumed by any one field of industry in the United States, while electrical transmission and cooking utensils require the next largest amounts, according to estimates of the consumption of aluminum in various industries, prepared by the Aluminum company of America. The percentage figures, which are given in the table below, are based on records of the company, with estimates of the use of imported and reclaimed aluminum not produced by the company. The Aluminum Company of America is generally credited with producing about 90 per cent of the total United States output of the metal.

Aluminum Distribution by Industries

Transportation (auto, railroad, railway, air and marine)	38%
Cable and busbar	16%
Cooking utensils	16%
Machinery (including electrical appliances)	8%
Iron and steel industry (largely metallurgical ingots)	8%
Miscellaneous nonferrous foundries and metal manufactures	4%
Building	3%
Chemical	2%
Food industry	1%
General miscellaneous	4%

United States production of aluminum in 1930 was approximately 99,000 tons.

The Metal Consuming Industries

How the Different Branches of Our Industry Fared in 1930 and Their Outlook for 1931.

The Brass Rolling Mill

By

WILLIAM J. PETTIS

Associate Editor

THE year 1930 has not been inspiring for the copper and brass rolling mills. Mostly they have been on the defensive, and no outstanding changes have taken place in the methods or mechanical equipment used in producing copper and brass in the different forms.

The laboratory has probably contributed more towards improved product than the mechanic, in notably reducing the heat treatment of the metals to a point of control of the "grain growth" under varying temperatures, and time exposures, that enables them to meet the many exacting demands of the users, and reproduce this quality indefinitely.

The present equipment for producing this material has been the result of generations of study and practice, and while no such sensational changes have taken place, in the industry, as has been witnessed in the steel mills of the country, it has been largely because of the difference in the nature of the material handled. The steels are readily cast in large units, and lend themselves easily to the quick reduction by the hot rolling process. This is not the case with the brasses, where the metal must be reduced by the cold rolling process, and, of necessity, in comparatively small units. There are far more subtle reactions to treatment of the non-ferrous metals than in the steels, and a change in one operation often sows seeds of disturbance in other directions.

While no notable changes have occurred in fundamental practices the brass mills can be cited as examples of high efficiency in mill operation and a maintenance of the high quality of their product.

The dream still persists of a day when the units handled will be in tons instead of pounds. While this may come true in the handling of copper and probably will, there just does not seem any way out in brass. But considering the character of the men behind the industry the "Can't be Done" may be the one factor that will make it an accomplished fact in the future.

The Brass Foundry

By

H. M. ST. JOHN

Associate Editor

DURING the past year, brass foundries, in common with other branches of the metal industry, have been hard pressed to find sufficient business for more than three or four days per week, operating at a reduced schedule. In foundries this condition had a particularly painful effect on costs because of the fuel consumption necessary to bring furnaces up to operating temperatures for part-time production.

A few far-sighted and well-financed institutions have taken advantage of the opportunity to modernize their equipment and layout at a time when this could be done at low cost and without serious interruption to production. Many, on the other hand, have had to limit themselves to the barest necessities. The large attendance and active interest at the Foundrymen's show in Cleveland indicated a progressive and optimistic spirit on the part of the foundry industry as a whole. The non-ferrous portion of the program was well attended and full of interest.

Two developments in melting practice mentioned in last year's review were the cupola method, using a very pure coke as fuel, and the special alloy container with gas as fuel. The cupola has made progress during 1930 and several successful installations are now in operation. The limitations of the process are not yet fully understood and a measure of conservatism is advisable when considering its application in any particular foundry. The cupola has been most successful in the melting of bronzes and other copper alloys low in zinc, particularly when it is desired to use dirty or contaminated scrap material as an element of the charge. As the percentage of zinc increases the metal loss becomes a prominent factor and its importance must be carefully weighed in determining the relative economy of the process.

Gas-fired furnaces using metal containers have not yet been so successful. Difficulty has been experienced with the containers and, so far as we know, there is no entirely commercial installation of this character.

Crucible manufacturers show an increasing interest in the production of refractories which can be used in connection with non-crucible furnaces. A recent development has been a clay-graphite liner for ladle shells, installed in one piece and providing space for insulating material between the liner and the steel shell.

It is to be regretted that brass foundries, as a rule, have shown little interest in the American Foundrymen's Association's work with molding sands. For a time it was felt by some brass foundrymen that the Joint Committee had rather neglected the subject of brass sands. In compliance with a number of rather urgent requests the Committee sent a questionnaire to a large number of brass

foundries, asking for information as to their sand practice and soliciting suggestions. So few replies were received that the Committee was forced to the conclusion that the brass men just weren't interested in the subject of sand. To one in touch with prevailing practices and with the savings which have been demonstrated through the use of A. F. A. tests and recommended practice this apathy is rather astonishing.

Somewhat more interest has been shown in the Association's efforts to work out a uniform method of cost accounting. The subject is a complicated one at best, even more complicated than in the iron foundry, but a real start toward its solution has been made.

Jewelry Making

By

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AN industry as old as the jewelry industry, with its heritage of centuries of high standing and good repute, can look unshaken upon the lean years as well as upon the fat years.

The past year called forth whatever equanimity and self-possession the industry could command. It will be recalled that the boom months of 1929 were not particularly fat ones for the jewelers; in fact, October, 1929, promised to be the first big season in several years; instead of which the depression arrived just in time to nip the Christmas trade in the bud.

Since then, the industry has been quieter and quieter, in every branch. The trade journals, quick to reflect the spirit of the guild, have been active in suggesting new lines, in opening up new methods of merchandising, etc., and in keeping up the courage of the downhearted.

The year is interesting mostly for the hints that have arisen regarding changes in fashion that may be forecast for the time of inevitable come-back. Will yellow gold return to popularity? The question is heard on every side. Will platinum become still cheaper? What about the other platinum metals—palladium, rhodium, and their alloys? What about chromium plating? What tendencies of design will lead in popularity?

To many minds the stage is set for radical changes in design, with a return to yellow gold and the designs of many years ago.

The influences working to this end include, first, the altered fashions in women's clothing. The long skirts, the ruffles, the trend toward the Victorian, are all bringing back the designs of that Golden Age. We saw it first in novelty jewelry; now we see it everywhere.

Another influence has been the recent sale in the markets of the world of the Crown jewels, heirlooms, antiques, jewels of great price and rare interest, sacrificed now to the tragic financial condition of the European world. Great estates have been broken up; great families impoverished. Never before have such treasures been available upon such a large scale, and naturally they have their influence upon the fashioning of newly-made jewelry.

The present round-table conference in London, between the British Government and the Princes of India, with the wealth of Oriental jewelry there on display, will be another telling influence on the designers of the coming year.

In both the Victorian and the Oriental modes we note that the amount of metal involved in a piece of jewelry is relatively large; wide surfaces, sometimes plain, sometimes hammered, are seen. The sketches below will refresh the reader's mind as to the contrast between a typical yellow gold mounting of a few years back, and the carved and intricate design characteristic of white gold or platinum. Will the lacy fragility of 1914-1930 be superseded by a reign of massiveness because of these influences?

On the other hand, the tendency toward the use of white metals is fostered, first by the low price of platinum, and second by the steady improvement in the methods of manufacturing white gold alloys. In addition, new alloys involving palladium, rhodium, etc., with or without more or less base metal, have reached the market and provide a promising outlet for these metals.

The world influences that have brought about this lowering of the price of platinum will be discussed elsewhere. But certainly there will be an effect upon the manufacture of jewelry. Will platinum push white gold to the wall? That seems possible, since to the jeweler it possesses every advantage over white gold except price. Or will fickle Fashion, which admittedly was charmed by the excessive expensiveness of platinum, now lose her love for the metal when its price goes down?

Silver also has suffered from low prices, the result of far-reaching political changes. This has stimulated the purchase of sterling silver flatware among buyers who were able to take the long view. On the other hand, the present lack of interest in large-scale entertaining, with so many families living in hotels, has cut down what might have been, in other decades, a big opportunity.

Ironically enough a vogue for pewter—an alloy that has slumbered forgotten for a generation—had to appear just in time to temper the demand for silverware.

Fig. 1

Fig. 2

Typical Ring Designs for Yellow and White Gold

Fig. 1 is characterized by massiveness and simplicity of design, is most suitably developed in yellow or green gold; not in white gold. Fig. 2 is characterized by carving and lacework and is suitably developed in white gold. A platinum top is generally used for the support of the stone on white gold ring mountings, because of its toughness and flexibility. (Illustrations, courtesy of Knight Manufacturing Company, New York City.)

It has been suggested that the present active development of white metals in industry—stainless steels, chromium plate, Alleghany metal—with their exploitation in architecture and elsewhere, may help to revive the vogue for yellow gold in jewelry. Years ago, when the metal used in industry was so largely brass or bronze, it was not surprising that the clean whiteness of platinum should attract the jewelry-buyer's eye. But now our eyes are surfeited with whiteness—the Chrysler tower, the doors of the newest theatre, the taxies, the plumbing fixtures—all are glittering silvery whiteness. Will we turn with relief to the mellow yellowness of gold? The next few months will tell.

Progress in Electroplating

By

Dr. A. K. GRAHAM

Associate Editor

WHILE electroplating research and development has been carried on intensively for the past fifteen years in this country and within recent years developments such as chromium deposition and automatic plating have been outstanding, the past year has been no exception in that it was marked by a steady trend toward better plating.

Nickel

What many consider the most unusual development during the last year has been the application of high pH nickel solutions to successful commercial nickel plating and while there is still much to be learned about the possibilities of these highly acid solutions, the General Motors Research Laboratories have made a most valuable contribution by their research efforts. This work further emphasizes the importance of varying the temperature and current density jointly in order to control the physical characteristics of the deposited metal. It is hoped that the possibility of using this type of solution in barrel plating, and further information as how to best overcome the present difficulties of pitting and as to the possible effect of impurities upon the operation of the bath will be forthcoming.

Stainless Steel

Another development, namely, the introduction of stainless steel in place of plated objects, particularly in the auto industry, has created considerable interest and focussed attention upon the improvement of commercial plated finishes. Experience with stainless steel has shown that it is subject to corrosion resulting from contamination of the atmosphere which was not recognized during the laboratory tests preceding this application. It is not believed that the corrosion is sufficient to entirely prevent its use as a substitute for plated finishes, but it has presented a serious problem in architectural metal work.

Zinc and Cadium

The electrodeposition of a cadmium-zinc alloy for rust protection, possessing corrosion resistance equivalent to that of zinc, an initial luster better than that of cadmium, and a hardness greater than either cadmium or zinc, is of considerable interest. The initial reports upon this development appear very promising, but, as is the case with all new developments, there remains much to be learned as to its possibilities.

The corrosion testing of cadmium and zinc coatings has commanded considerable attention, and while it must be remembered that the results of any corrosion test are not strictly applicable unless the exact conditions existing during that test are maintained, yet it appears from the published results that zinc is unquestionably superior to cadmium in outdoor or semi-outdoor exposures, but that in mild exposures or for indoor use, cadmium and zinc are of equal value. In marine exposure, however, cadmium is undoubtedly superior to zinc.

The question of how plated zinc or cadmium coatings compare with hot dip coatings is still unanswered in spite of a preliminary report from the sub-committee of the A. S. T. M. in which the hot dip coatings are stated to be better. It is generally recognized that the present data does not justify any such conclusions.

Chromium

While the number of papers devoted to the subject of chromium plating have decreased greatly within the last year, the few that have been published have been of unusual interest. The General Motors Research Laboratories have shown that by heat treating the chromium deposit is much more resistant to corrosion and less porous. This is explained by the fact that heat treating produces a number of very fine cracks which in the non-heat-treated metal would appear as few and relatively broad.

A paper published from the George Washington University of St. Louis indicates that the throwing power of chromium solutions is improved by the addition of metal salts such as cadmium, cobalt, nickel and zinc. While claims were previously made as to the specific effects of such metal salts, the limited accuracy with which other variables were controlled in the past made it impossible to properly evaluate the improvement.

The use of calcium chloride as a spray for testing the corrosion resistance of chromium coatings was developed by the General Motors Research Laboratories and offers a more practical means of rating the corrosion resistance of chromium deposits.

Aluminum and Its Alloys

The manner of obtaining successful deposits upon aluminum and its alloys depends upon the application of the principles originally published in the paper by Dr. Work on the nickel plating of aluminum. As a result of this study extended application of electroplating to aluminum and its alloys has been possible.

The anodic treatment of aluminum or its alloys for corrosion resistance while not undergoing any new developments within the year has also seen extended applications of its use. The coloring of such anodic films has developed rapidly and a still further development in this direction is anticipated within the coming year.

Education

A resumé of the developments of the year would not be complete without mentioning a most significant development for the welfare of the plating industry, namely, the revival of the educational efforts of the American Electroplaters' Society in attempting to organize classes within every branch of the Society within the year. That the analytical control of plating solutions has not only come to stay, but is recognized as of immense value, was proven by the animated discussion and intense interest in the educational session devoted to this subject at the Washington conference.

Miscellaneous Alloys

Papers dealing with the electrodeposition of silver-cadmium and cobalt-nickel alloys have been published, but no commercial development in connection with either of them is known to the writer at the present time.

Engraving Plates

The Bureau of Engraving and Printing is now making their plates of electrolytic iron, having discontinued the use of the alternate deposits of copper and nickel. The electrolytic iron is said to have a tensile strength of 56,000 pounds per sq. in. and an elongation of 20 per cent as it is taken from the bath.

Pickling

Two electrolytic pickling processes have been made public within the year, namely, the Bullard Dunn Process and the "Bright Dip" pickling process of the Hanson Van Winkle Munning Company. The latter owes its name to the fact that the metal comes from the operation entirely free from smut and with a brilliant surface. Both processes are claimed to completely remove any oxide, to eliminate the necessity of an inhibitor, to give negligible metal loss, and to greatly reduce ordinary pickling time. While the former is claimed to give no acid embrittlement on any work, the latter is said to be able to process all but the thinnest wire or spring stock, which cannot adequately carry the current, and will satisfactorily pickle the alloy steels.

Tanks and Anodes

Rubber lined steel tanks are rapidly replacing wooden or lead lined tanks for acid pickles and many plating solutions. Sulphuric or hydrochloric acid may both be used in them and solutions may be operated hot or cold. It is possible to keep the tanks and plating room cleaner than with wooden tanks where leaking and crystallization of the platings solutions about the tank most always occur.

Centrifugal casting of anodes in chill molds is now being employed and it is believed that this new development is going to revolutionize the anode business. It is most certain that any anode so cast will be much more dense and uniform in structure than ordinary metal and experience has shown that the more uniform the structure the better the anode corrosion.

American Electroplaters' Society Research Fund

THE Research Committee of the American Electroplaters' Society, which administers the Research Fund of that organization, has issued a statement with regard to the financial requirements for carrying on the research work of the Society. After outlining the general purposes of the Society, which include the continued pursuit of information on electroplating, the committee says:

"Most manufacturing plants do not have facilities or personnel for research on plating, though such studies are being made in several University and industrial laboratories. One of the organizations engaged in such investigations is the Bureau of Standards, which has facilities for analytical, physical, electro-chemical and metallurgical studies of plating processes and plated products. The official funds available for plating researches are sufficient to maintain a small staff in that section, but not to make rapid progress on the many problems in need of the study. During the past three years the Electroplaters' Society has made use of the Research Associate Plan of the Bureau of Standards, by which the salaries of qualified investigators are paid by an outside organization, and the facilities and supervision of the Bureau are made available.

"The Society has expended on research work by two Associates about $13,000 that was collected from its Branches and from manufacturers. The first problem investigated was the spotting out of plated products. The results of this investigation have been published in detail in Bureau of Standards Research Paper No. 72. Copies of this paper have been sent to all the subscribers to the Research Fund, and to all members of the Society. If you desire a copy of this paper, write to the Secretary of the Research Committee.

"The next subject studied was throwing-power in chromium plating. This research has just been finished and the results will soon be published by the Bureau of Standards and distributed by the Society to Research Fund subscribers and members. In the meantime, a summary of the results can be obtained on request to the Bureau of Standards.

"An investigation has just been started upon the protective value of plated coatings, especially of chromium. This subject is of importance to all manufacturers of plated products, such as automobile and plumbing fixtures. The study will include exposure tests of plated metals upon racks maintained in various parts of the country by the American Society for Testing Materials. Other studies on chromium plating are being planned.

"In order to make rapid progress in these studies, it is desirable to raise $10,000 per year for three years. The Society, through its Branches, will no doubt contribute $1,000 per year. In addition, it is hoped that at least 100 firms will each invest $50 per year in this project.

"Further information regarding the Fund and its plans may be had by addressing the Chairman of the Research Committee, R. J. O'Connor, 41 Bancroft Avenue, Bridgeport, Conn., or the Secretary, Philip Sievering, 20 South Crescent, Maplewood, N. J. Data or publications on plating may be obtained from the Bureau of Standards, Washington, D. C.

Electroplaters' Society Conference on Electroplating Standards

ALL interested persons are invited to attend a conference on electroplating standards to be held at the Palmer House, Chicago, January 17, 1931, at 9:00 A.M., under the auspices of the Chicago branch and the Research Committee of the American Electroplaters' Society. Those who expect to attend, are requested to notify Mr. Jacob Hay, 6920 Ottawa Avenue, Edison Park, Chicago, Illinois, so that necessary arrangements may be made.

The purpose of the conference is to include both the materials used in the plating industry and the plated products, and to consider in each case (a) whether a specification is needed, (b) what is a reasonable basis for such a specification, (c) whether sufficient information is now available to prepare at least a tentative specification, (d) whether any existing specifications meet the need; and (e) to take steps toward the preparation and adoption of suitable specifications by the American Electroplaters' Society, in cooperation with other interested organizations.

Oxidized Metal Finishes on Aluminum

By R. E. PETTIT

A PAPER READ AT THE ANNUAL CONVENTION OF THE AMERICAN ELECTROPLATERS' SOCIETY IN WASHINGTON, D. C., JUNE 30-JULY 4, 1930, AND PUBLISHED IN "THE MONTHLY REVIEW," DECEMBER, 1930.

The coloring or "oxidizing" of plated aluminum, as in the case of the coloring of other metals, depends upon the skill of the operator and the methods used. In the past the plating industry has avoided the coloring of plated aluminum because of the lack of successful plating procedures. Actually, it is as easy to plate on aluminum as on other metals, and these electroplates are easy to color using the standard commercial methods. There are one or two precautions that must be taken.

COPPER, over either a preliminary zinc or nickel coating, may be "oxidized" in the usual way by sulphide solutions to give various shades of brown and bronze. Brass or silver coatings over a preliminary nickel coating may be "oxidized" to various colors in the usual way and thus allow aluminum to be used in places where its physical properties and economy make it advisable and yet for reasons of surface appearance it is necessary to have a different color.

Zinc can be satisfactorily deposited on a smooth aluminum surface. Such a deposit will adhere well and resist corrosion. When another metal, such as copper, is plated over the zinc, the corrosion resistance of the plate falls considerably and the coating will blister and peel on very short salt spray exposure. The corrosion resistance may be increased by subjecting the article to a heat treatment. This heat treatment adds to the cost of the finished article and has no commercial application at present.

Oxidized copper finishes on aluminum, **over the preliminary zinc coating,** are not satisfactory unless the service to which the article is to be exposed is extremely mild and dry. Plates of brass and silver over the preliminary zinc coating generally give trouble and are not usually recommended.

For general use a preliminary nickel coating is recommended. For detailed information on the mechanics of nickel plating on aluminum the paper by Work (Trans. Am. Electrochem. Soc. 43, 361, 1928) should be consulted. To present clearly the methods employed in obtaining "oxidized" effects on aluminum and its alloys, it will be necessary to briefly touch upon the application of a nickel coating on aluminum.

To successfully electroplate nickel on aluminum, the aluminum surface should first be given a special etching treatment. The type of roughening produced by a sand blast is not sufficient to secure good anchorage of the plate. It is necessary to produce a roughened surface with pits having a special undercut shape so that the coating electrodeposited in the pits will be securely anchored. A surface of this type is produced by chemical means which dissolves certain of the metal constituents selectively, and the character of these pits or undercuts varies greatly with the composition and temper of the metal being etched.

In nickel plating on aluminum and its alloys, the following procedure has been found satisfactory. The metal is first cleaned for about 30 seconds in a hot mild alkaline cleaner. Any mild commercial cleaner may be used. One to three ounces per gallon each of trisodium phosphate and sodium carbonate works satisfactorily. The cleaning operation is followed with a clean cold water rinse. If the work going through consists of sand or die castings, the cleaning treatment is followed with an acid etch composed of three parts of nitric acid (Sp.g. 1.42), and one part of (50 per cent) hydrofluoric acid. This bath is used at room temperature. The etching time will vary greatly with bath temperature and alloy composition, die castings usually requiring about a 15 to 30 second etch, while sand castings are treated for a longer period, 60 to 120 seconds. When the casting has been properly etched it should be thoroughly rinsed in clean cold water and transferred to the nickel plating tank.

If the work going through consists of commercially pure aluminum, 2S, the water rinse, after the alkaline cleaning dip, is followed by a 5 per cent hydrofluoric acid treatment and another clean cold water rinse. The hydrofluoric acid bath is used at room temperature, and a 10 to 15 second treatment in this bath is sufficient. The surface etching of the 2S metal is the next step in the procedure and is accomplished with a bath of nickel chloride ($NiCl_2.6H20$) (37 ounces per gallon) and hydrofluoric acid (Sp.g. 1.18), (0.2 gallons per gallon of water). This bath may be varied within wide ranges to meet special requirements as the actual composition of the dip is not as important as the resultant adhesion of the electroplate. The effect of dip temperature on the dipping time is very marked and the temperature of the dip should be controlled or the time of dip varied to compensate for temperature changes. Generally a dipping time of 15 to 40 seconds is desirable for production work. After etching, the work should be thoroughly rinsed in clean cold water. It is then ready for nickel plating.

If the material being handled is either 3S (1.25 per cent manganese) or one of the strong alloys known as 17S, 25S, and 51S, a slight change in the 2S procedure is made. A bath of manganous sulphate ($MnSO_4.2H_2O$) (0.5 ounces per gallon) and hydrochloric acid (Sp.g. 1.18) (0.5 gallons per ½ gallon of water) is substituted for the nickel chloride-hydrochloric acid dip. After the work has been etched in the manganese bath it should be thoroughly rinsed in clean cold water and transferred to the nickel plating tank. The time of dip in the above solution varies with the alloy composition and heat treatment and the bath temperature. The correct etching time will generally be found somewhere between 10 and 60 seconds.

In handling aluminum and its alloys through the dips, the proper timing must be carefully determined by experiment as it is the important step in the plating procedure. This is accomplished by plating various samples at different dipping times, breaking them, and noting the adhesion. A properly dipped sample will show no flaking of the nickel from the aluminum and should color buff readily. Under-dipped samples show poor adhesion, while over-dipped samples do not color readily. It should be understood that the etching solution must be adapted to the particular alloy composition which is to be plated, and experience has shown that even these solutions must be modified from time to time to meet special conditions.

In applying the nickel plate to the properly etched aluminum surface it may be said that any nickel plating bath which operates successfully for zinc will prove satisfactory for aluminum.

Up to the nickel plating of the aluminum, the procedure followed has been different from that followed when plating nickel on other metals. After the aluminum article has been coated with nickel it may be handled in the same manner as any other metal which has been nickel plated.

and over which brass, copper or silver is to be plated and colored.

For successful color work on aluminum the article should be plated with nickel for about 30 minutes to insure complete anchorage in the etching pits. It is not necessary to color buff the nickel before applying the electroplate that is to be "oxidized," although if desired this may be done. A coating of copper is applied over the nickel from an acid copper bath, and this plate is colored. If "oxidized" copper effects are desired, the work should be wiped to remove buffing grease and immersed in a coloring solution until the proper color has been produced. Brass or silver plates are best applied over a copper plate, and articles so plated may be colored in the usual way.

In studying "oxidized" or colored effects on copper, brass, or silver plated aluminum and its alloys a number of solutions were tried. For the browns and blacks on copper, ½ to one ounce per gallon of potassium sulphide gave very good results. The sulphide solution functions best when warm. A bath of potassium chlorate. 4 ounces per gallon, and copper sulphate, one ounce per gallon, gives a pleasing brown on copper plated aluminum. A solution composed of lead acetate, 2 ounces per gallon, and sodium hypo sulphite, 4 ounces per gallon, is very effective in producing several colors on copper plated aluminum. Colors such as straw, blue, purple, and gray may be obtained from this solution. This solution is used at about 150° F. The above solution is also very satisfactory in obtaining several shades of blue and purple on brass. The best "oxidized" effects, such as antique brass, are obtained on brass plated aluminum with a warm potassium sulphide dip composed of ½ ounce per gallon of sulphide, and a very weak warm sulphuric acid dip used alternately with a hot water dip. The operation is repeated until the desired color is obtained. A brown is produced on brass plated aluminum by an antimony trisulphide and caustic soda dip, but in working with this dip and others containing a high caustic content, special care must be taken. The necessary precautions will be discussed below. The potassium sulphide dip containing about ½ ounce per gallon of this salt is very satisfactory in producing "oxidized" effects and green on silver plated aluminum. The finishes mentioned above can be scratch brushed or high lighted with wet pumice to give any desired effect. The finished article should be dried and lacquered.

The presence of a high caustic content in a coloring dip gives some trouble when coloring plated aluminum. As an example, an antimony trisulphide and caustic soda dip for coloring brass brown was made up containing 4 ounces per gallon of the antimony salt and 8 ounces per gallon of caustic. When a piece of brass plated aluminum was immersed in this dip, trouble invariably resulted. When the dip was modified so that just enough caustic was added to "take-up" the antimony salt and not have an excess of caustic, the bath functioned satisfactorily. During the period of this study of oxidized finishes on plated aluminum, stain spots on cast metal were encountered. These stain spots usually appeared within 48 hours after the article had been finished. Examination generally showed the area of stain to be around a slight pit in the metal, indicating that solution had been trapped in the pit and later had seeped out, discoloring the adjacent area. Care in washing the finished article will greatly reduce the possibility of these stain spots appearing. Crystal spots on metals having a metal sulphide finish have not been encountered, although under conditions more favorable for the formation of these spots some trouble may be encountered. For the methods of prevention of spotting on "oxidized" plated finishes, the research paper No. 72, Bureau of Standards, by W. P. Barrows, shoud be consulted.

The coloring of plated aluminum is as easily accomplished as the coloring of other metals. The success or failure of producing colored finishes on aluminum and its alloys lies in the application of the nicked coating. If the nickel coating is properly applied, copper, brass or silver may be readily plated over the nickel, and these coatings "oxidized" to give various colored effects now obtainable on other metals.

Dr. A. K. Graham: The methods of preventing the two kinds of spotting which are referred to in this paper —the result of the work of the research fellow of this Society—have been very successfully applied to preventing both types of spotting on plated aluminum articles by one concern in Philadelphia, and it is a testimony to the success of the research work that this Society has carried on. Very severe examples of both types of spotting had been experienced with aluminum, producing oxidized and plated finishes, but the use of the protective lacquers that they recommended in the paper put out by the Bureau proved very successful.

Evening Course in Electroplating

The course in practical electroplating at the College of the City of New York will start a new class on February 9th, under the personal direction of Dr. L. C. Pan. It is open to all persons interested in electroplating, metal finishing, and chemical control of plating solutions. The class will meet on Mondays and Wednesdays from 7 p. m. to 11 p. m., in the Chemistry building, Amsterdam Avenue at 139th Street, New York City.

The phases of the subject covered by the course are as follows:

Fundamental principles underlying the various operations of modern electroplating.

A critical study of present-day practice in electroplating of various metals and alloys, including copper, nickel, chromium, cadmium zinc, brass, iron, lead, tin, silver, gold, and platinum.

Physical and chemical methods of control, including simplified methods of analysis and preparation of standard reagents.

Laboratory work will constitute an important part of the course. Among the exercises to be done in the laboratory are those dealing with Faraday's Law, current efficiency, determination of thickness of deposit, electrode potentials, polarization and depolarizers, metal, metal-ion, and hydrogen-ion concentrations, addition agents, brighteners, throwing power, porosity and corrosion tests, analysis of plating solutions. The laboratory work is arranged flexibly so as to meet the individual needs of each student.

Registration may now be made evenings in person, or by mailing a check or money order, payable to the College of the City of New York, for $30.50 to Walter Stalb, bursar, Room 100, Main Building, College of the City of New York, 140th Street and Convent Avenue, New York.

The Problems of the Metal Industries

By ADOLPH BREGMAN

Managing Editor

A discussion of some of the important technical and commercial difficulties which beset the various branches of the trades manufacturing and finishing metal products. General depression, price decline, illegitimate competition and lack of adequate standards are evils common to all branches. We need not only more business but better business.

THE past year has been a period of problems. To be sure the one problem which overshadowed all others was the decline in general business. But this was not all. Not only were there many problems outside of and in addition to this great one, but there were evils which existed before the decline and others which came as effects. Many of the difficulties we have had with us even in our best times, were accentuated when the depression overtook us.

The metal industries are peculiar. Unlike many other fields of activity, they are not one homogeneous line, but are made up of scattered, diverse and often seemingly unrelated types of work. Consequently it is necessary to segregate them, as far as possible, and to take up each group, with its peculiar questions, separately.

ROLLING MILLS AND FABRICATORS

One of the largest general groups in the non-ferrous metal trades is made up of the so-called brass rolling mills, which take in raw metals, alloy them and turn out, to a large measure, semi-fabricated metal and alloy products in the form of sheet, rod, wire and tube. The alloys are largely of the copper base type, varying from pure copper to 60 copper, 40 zinc brass. In addition, there are of course, numerous special alloys such as nickel silver (German silver) and the high nickel alloys. A few brass mills either specialize in or include the nickel alloys, but the bulk of the high nickel products like Monel and pure nickel forms are turned out by the nickel producer just as the bulk of the aluminum fabricated products are turned out by the aluminum producer and rolled zinc products, by zinc producers.

Depressed Business and Price Cutting

Two large problems confront the rolling mills. One is the general business situation in which two of its largest consumers, automobiles and buildings, are suffering from extraordinary declines. Until these great consumers get back to reasonable outputs, metal fabricators will find themselves running below par. The other problem, undoubtedly brought on by the depressed conditions, is the epidemic of price cutting and taking work below the point of profitable operations in a field in which the margins were already cut closely even in the high times of 1928 and 1929.

New Products and New Outlets

Two avenues of escape have so far been opened. One is the development of new uses for non-ferrous fabricated products through the co-operative efforts of the copper producers and the fabricators. Brass piping for buildings for example, has been developed to the point of being a very important consumer. Another avenue is that of new alloys. While the copper-base alloy field seems to have been explored thoroughly, being one of the oldest and best known combinations of metals, still we have the example of new mixtures, within a comparatively recent period, like the silicon bronzes. It seems to be the opinion of competent authority that a vast field is open to these alloys which will be more rapidly evident now that the period of trial and experimentation is practically over.

The terrific decline in price of copper has been costly to the producers, of course, but also to the fabricators who have been forced to take heavy inventory losses. If this disturbing factor can once be eliminated and the price of copper be set on a firm foundation, industry can devote itself to development and reasonable expansion, at the same time resting on the base of stable prices.

On the whole, the industry is in strong hands, peopled as it is of necessity, with organizations with large capital, and fortunately enough, with a broad outlook. To a considerable extent the fabricating industry has become associated with the copper producers and so far at least, the results seem to have been beneficial for both.

THE BRASS FOUNDRY

The brass foundry, as it is generally known, does more than merely cast brass. It casts aluminum, zinc and other non-ferrous alloys but in very much smaller and steadily decreasing proportions. At one time every non-ferrous metal had to be cast in the brass foundry. Now zinc base alloys are made in the die casting shop, lead and tin alloys are made in die castings, in slush molds and in permanent molds; and aluminum, once the great impetus of the sand foundry, has been drifting to the die caster and permanent mold shop. The brass foundry, then, is left largely with the copper base alloys and those aluminum alloys, which by their composition or the design of the part, cannot be made in any but sand molds.

The great staffs and supports of the brass foundry have been the automobile, building, electrical and railroad equipment and that accounts for the economic conditions existing in brass foundries today. Electrical industries have done not so badly, but of course, could hardly be expected to offset the declines in the other trades.

Cutting Material Handling Costs

In the brass foundry, progressive companies have learned the need for cutting their costs and saving operations. To a great extent, in the last few years, this has been done by the aid of material-handling equipment. Better and faster molding machines have helped but sand handling and metal handling devices have been probably the largest factor in reducing operating costs. Obviously such installations call for financial strength as they run into large sums. Here again, the small brass foundry is at a disadvantage.

Molding sands still offer a problem to the brass foundrymen, but the response to an inquiry instituted by the American Foundrymen's Association has met a very disappointing lack of interest. Perhaps the times are responsible for this attitude. Whatever the excuse, the question of improvement in methods of mixing and increasing the life of sands remains one of utmost importance. The great progress made in other foundry departments such as melting and refractories should point the way.

Standard Ingots Needed

The brass foundry has taken an important step forward to eliminate one of its bugbears—the confusion in ingot metal prices and qualities. During the past year a set of standards has been developed and published as tentative by the American Society for Testing Materials in co-operation with the Non-Ferrous Ingot Metal Institute. (See THE METAL INDUSTRY for October, 1930, pages 479-480.) It is hoped and confidently expected that in a short time the trade will accept such a set of specifications, upon which prices can be based and consequently variations in prices can be fairly compared, thus eliminating the uncertainty to the foundryman concerning what he is getting in his very important raw material, the ingot alloys.

The nomenclature of non-ferrous alloys still leaves a great deal to be desired. There are many overlapping compositions, each with its own trade name. This always happens when a new field is opened, and later, when the turmoil dies down, one or two leading products remain. The important thing to watch is that such names shall not be misleading in character and it can be said that this irritation seems to be declining. What we really need is, of course, fewer alloys and then we will have fewer names with less confusion and misunderstanding.

ELECTROPLATING AND FINISHING

The electroplating and finishing industries are feeling, in addition to the current recession in business, the fact that chromium plating, the great stimulus of recent years, is no longer a novelty. Not that it is dying out. On the contrary, it has, for practical purposes, been accepted as the standard white finish, where formerly nickel was used. But it is no longer new or different. It is taken as a matter of course.

Illegitimate Purchasing Methods

As a consequence a large proportion of the meat which was in the chromium plating business at the beginning, is being cut away. It is a standard plate. Purchasers are shopping around for prices and taking the lowest bidder almost regardless of quality. In most cases, the cheapest bidder does the worst work, the chromium plating does not stand up, the purchaser finds himself "cheated," and instead of being the baby and darling of the family, chromium is in danger of being looked upon as the bad boy.

Here is a typical example of what goes on when a plating job is to be placed. The prospective purchaser goes to one shop and says, "Give me your best price for a first class job," and gets, let us say, a figure of 25 cents. He takes the sample to another job plater and gets a price on a fair job, which is perhaps 20 cents. Then he gets a figure from a third shop asking for the lowest possible bid and gets an offer of 15 cents. Bear in mind that these prices must be for totally different classes as no one can provide a 25-cent plate for 15 cents. He offers to let the top bidder have the job for 14¾ cents. If this offer is accepted, the plater must lower his quality or lose 10 cents a piece; and since he cannot afford to go on losing, he reduces his quality. If he refuses to accept the lowest figure, the job goes to a lower bidder who, of course, turns out only a 15-cent plate and the 15-cent plate is rarely satisfactory.

Electroplating Needs Standards

What does this point out? Simply the absence of standards in the plating industry whereby it might be possible to make adequate comparisons. It is needless to say that the coming Conference on Electroplating Standards, held under the auspices of the Chicago Branch of the American Electroplaters' Society and the Research Committee of that Society, has the possibilities of beginning a movement which will be the saviour of the industry.

Another habit of purchasers of plating is to submit samples for estimate and then send in work of a different character. Every plater knows how an occurrence of this kind will disorganize his shop.

A Workable Cost System

The old standing need of electroplating plants—an adequate and simple cost system has not yet been filled. The small shop still runs quite frankly by the guess and hope system and the large shops, by a variety of methods which make price comparisons impossible and estimates widely divergent.

Pitfalls in a Growing Business

It is a fact also that the plating industry is subject to another trial, which, while it appears in other fields, is none the less serious. A job plating shop grows with its customers. But if its customers grow too large, it cannot grow with them, as then these organizations install their own plants taking their work away from the job plater. Consequently the jobbing shop must be carried on small to medium sized customers. If any one of these customers grows so large as to absorb too large a proportion of his capacity, the plater is in danger as the loss of this one customer may ruin him.

Competition of Stainless Steel

Certain technical developments have appeared which the plating industry must watch carefully. Stainless steel of the 18 per cent nickel, 8 per cent chromium type continues to grow in popularity. It is known to have extraordinary properties which its proponents claim will eliminate the need for plating. This remains to be seen. The fact is that the extended use of stainless steel in different climates is said to have brought out a tendency to dull its appearance, necessitating further polishing which is difficult. The hardships of fabricating and manufacturing this type of steel are already known; also the high cost. If electroplating keeps up its quality and continues to develop along the lines of new, better and more attractive finishes, it should not be held back by stainless steel. One advance in this direction is the development of colored aluminum surfaces, from which a great deal may be heard within the next year or two.

Automatic Equipment

Electroplating has recognized the need for cutting costs by substituting machine methods for hand labor in handling its work. The automatic and semi-automatic plating machines are the outstanding examples of the trend in this direction, where the output justifies such installations, and these cases are many in number. The automatic plating machine has been one of the wonder-workers of industry.

JEWELRY MANUFACTURE

The manufacturing jewelry industry, perhaps more than others, has had a difficult time. It is classed as a luxury trade and therefore, suffers more in depressions than the necessities.

Style Changes

One great problem, ever present in good times or bad due to the very nature of the industry, is the instability in styles and its subjection to the varying whims of the

buying public. One year heavy designs are popular; the next, nothing but filigree work will sell. On every side we hear now, "Will yellow gold come back?" "Will platinum at $30 an ounce, cut into white gold?" "Will chromium plating grow still further in popularity in jewelry?" "What about palladium and rhodium?" "What will the buying public want next year?"

In addition to these mysterious and seemingly endless questions, the industry has suffered from unprecedented declines in its raw materials, aside from gold, of course. Platinum and silver were never so low, and while this may make for better business in the future, allowing wider distribution, nevertheless at this time, when purchasing is retarded by the general depression, it has resulted only in depreciated inventories.

Machines Superseding Artisans

The jewelry industry has changed character in the past years. It is no longer a large field for artisans and highly skilled trained workers. It is now a machine trade turning out vast quantities of products at unbelievably low prices. The public knows that a machine stamped piece of jewelry is as good and can be as well designed as a hand-made article; at the same time, of course, far less expensive. Consequently, hand-made goods are now manufactured only to special order for those who can afford to pay high prices—necessarily a very small group. The small shops making a moderate or low priced line are having great difficulty in competing with the large factories with their expensive high production equipment. It seems, therefore, that the small shop may revert eventually to special, high grade, hand-made jewelry.

Better Stamping Laws Needed

The jewelry industry needs improved national stamping laws to eliminate the unfair competition which results from selling different grades of materials between which the buying public cannot differentiate, consequently buying on price alone, which puts the strictly honest manufacturer at a decided disadvantage.

The hope for the jewelry industry lies in better times and better control within itself. It is to its credit that it has been able to continue to do so well under such difficult conditions.

Lacquer Troubles

Some of the specialized lines of the metal finishing industries have technical problems peculiar to themselves. Lacquer, for example, has a special function, namely that of protecting metal surfaces, in some cases with a transparent coating, in others with a specially colored coat. The old bugbear of "blushing" is still in evidence but has been traced to several specific causes which can, by careful mixing and handling, be avoided. Blushing may be caused by too rapid evaporation, by excessive moisture, by an unbalanced solvent content or by a poor thinner. The lacquer in which the thinner evaporates evenly and the solvent conditions is well balanced will not blush if it is correctly applied.

Another great trouble is the lack of uniformity in products which are supposed to have the same color. This is due to the fact that the colors change on exposure and pieces finished at different times will have different shades. A customer submitting a sample which he wishes to match must take into consideration that his sample has been made some time before, and that a lacquer which will match it at the time of submission, will not match it several months later.

The commercial difficulties of the lacquer industry are similar to those of other trades. There is a considerable amount of illegitimate competition, selling low grade products on a price basis only, which is very difficult to eliminate. Immediately after application, a cheap lacquer looks as well as an expensive lacquer. One coat will sometimes look as well as two. Only time will disclose the difference in wearing qualities and it is this difference which accounts for the variations in prices. It is hard to sell a customer a more expensive article which looks, at the first glance, no better than a cheap one, and it is only after he has been taught by time and experience, that he can appreciate the lasting qualities of the more expensive material. A campaign of education of the lacquer consumer or user would be a worthy object for the whole trade. Here again standards are needed.

The needs of the plating and finishing industry can be summed up in a very few words. It must have standard specifications and standard methods of testing finishes. It should have a simple, accurate method of determining costs, applicable to both large and small shops.

This article will be concluded in an early issue.—Ed.

Hot Tinning

By WALLACE G. IMHOFF

HOT tinning is a very delicate process and it must be applied specifically to each kind of material tinned. The tinning of cast iron and malleable iron or gray iron is entirely different from the tinning of steel articles. Each one has its own definite method of procedure.

Castings must be thoroughly cleaned in a good commercial cleaning solution and then sandblasted. Small castings are tumbled until perfectly clean and smooth. From the cleaning and tumbling process the castings are put through a light pickle of muriatic and hydrofluoric acid. This removes all scale and any sand particles fused or imbedded in the coating. From the pickling solution they are rinsed clean and kept in a water storage tank until ready for use.

Small steel parts are first tumbled to give them a very smooth surface, and then are pickled in a 4% solution of sulphuric acid to remove the iron oxide and scale. The pieces must be perfectly clean after coming from the pickle. From the pickle the pieces are washed thoroughly in a water rinse bath and then dipped in a commercial solution of hot tinning flux. After coming from the liquid tinning flux the articles are allowed to drain and then slowly put in the tinning pot one at a time, or on racks, depending upon the size and shape of the work. The temperature of the tin depends entirely on the class of work being tinned and the number of articles put in the bath at one time. Tin melts at 449.4 degrees Fahrenheit. The metal temperature should be kept as low as possible, about 500 to 520 degrees Fahrenheit.

Only a good high grade tin should be used as trouble will develop very quickly with inferior metal. The ordinary impurities in tin are lead, arsenic, antimony, iron, bismuth, copper, tungsten, and molybdenum.

After coming from the tin pot the articles are dipped in a bath of kerosene oil placed in a water bath. After this bath they are dried with sawdust or any good commercial drying material, and then sent for inspection.

Problems in the Brass Foundry

Practical Questions and Their Answers

By W. J. REARDON,
Associate Editor

Flux for Aluminum-Iron Alloy

Q.—We deal in minerals and metals. A foreign customer sends us the following inquiry:

"Business friends inform us that there is manufactured a certain flux which is used for diluting a ferroalloy in an aluminum foundry in your country."

Can you identify the product and the source?

A.—We do not quite understand this question. However, we take it that the idea is to introduce iron into aluminum alloys. This is done by making a hardener of copper, iron and aluminum. There is no flux used.

W. J. REARDON

The iron and part of the copper is charged into the crucible; as the iron gets red and the copper is melting, about 10% of the aluminum is added to the iron and copper. When this is melted, the balance of the aluminum is added and poured into ingots, and called "Rich Alloy."

The "Rich Alloy" is composed of approximately: 10 iron, 50 copper, 40 aluminum.

If 1½% of iron is desired in the aluminum, a mixture of 85% aluminum is melted and 15% of "Rich Alloy" is added. This will give you a mixture of approximately 91% aluminum, and 7½% copper, and 1½% iron.

If the above is not what is wanted, please state just what you desire to do and we may be able to help you. We know of no flux that will introduce a ferroalloy into aluminum. The above describes the general practice in most aluminum foundries. Some purchase the "Rich Alloy" from manufacturers of such alloys.

Die Casting Metal

Q.—We are in the business of manufacturing die castings. Until now we have purchased our aluminum and and zinc alloys. We are contemplating alloying our own metals, especially zinc. The formula used is as follows:

Electrolytic zinc	93%
Aluminum	4%
Copper	3%
Magnesium	1/10 of 1%

Have you any publication or articles on the latest method for alloying these metals?

We have both gas and electricity available. We prefer to use gas or oil. We have two Kemp gas mixing machines in connection with our die casting machines.

A.—If you desire to make your metal, there is nothing difficult about doing so. We suggest that you use a tilting type crucible furnace, which can be run with either gas or oil for making your hardeners. For an alloy such as you require, containing 93 zinc, 4 aluminum, 3 copper, and 1/10 of 1% magnesium, first make a hardener of 43 copper, 57 aluminum. Pour in ingots and secure an oil or gas-fired, stationary, cast iron pot, melting furnace, which can be had in from 500 to 5,000 lb. capacities. Melt the zinc in the cast iron pot. Make a mixture as follows: charge 93% zinc; when melted add 7% of hardener. Stir well and use sal ammoniac as a flux. Just before pouring in ingot molds, add 1/10 of 1% magnesium.

There is nothing difficult about making zinc die casting alloys. Do not let the metal get too hot.

Pour into molds just when the metal will char a pine stick.

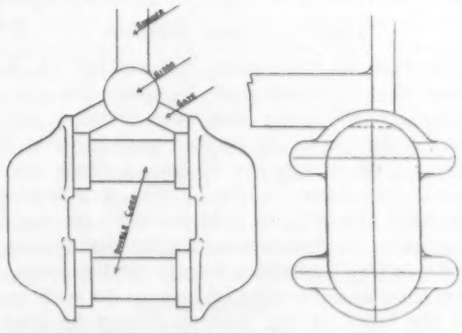
Bronze Pressure Casting

Q.—Under separate cover we are sending you a casting which is imperfect and which leaks when under pressure of 220 lbs. This casting was made of metal having the following formula: 86 copper, 8 tin, 3 lead, 3 zinc. This is melted in a No. 45 crucible, in a fuel oil furnace, using 1½ ounces of 15% phosphor copper as a deoxidizer, and poured at approximately 2200 deg. to 2300 deg. Fahrenheit. We use No. 00 Albany sand; two metal patterns to a gate; the grinding marks on the castings will show how gated; mould poured on end, slightly elevated.

If you can recommend any solution to our trouble, we will greatly appreciate it.

A.—Examination of the casting discloses shrink holes, to all appearances at the gate end. The trouble may possibly be due to the grade of sand. We suggest that you open up the sand, adding No. 2 Albany sand to the No. 00 in 50-50 proportions. This will give a sand mixture that is not so fine.

Another thing that might help would be changing the



Gating for a Bronze Pressure Casting

metal to 84 copper, 10 lead, 3 zinc and 3 tin. The lead will close the grain and make the alloy tighter. We know of pressure work for air brake castings that is produced in this alloy and which is very successful under a pressure of 220 lbs. This alloy also shrinks less, which is also better for your class of work.

Another suggestion is that you gate the casting as per the sketch herewith, if you are not doing so now. However, see that the gate is large enough to feed the casting and that it is the last metal to set. The section is quite uniform and should be set quite even.

Problems in Electroplating and Finishing

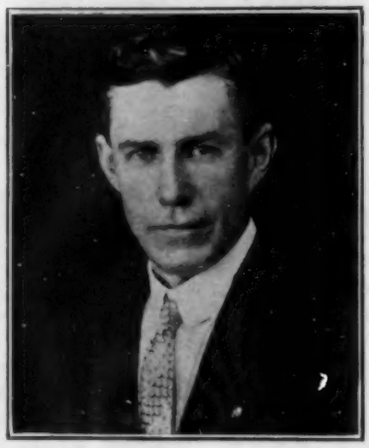
Practical Answers to a Variety of Typical Questions Asked by Subscribers Who Have Difficulties to Overcome

By OLIVER J. SIZELOVE
Associate Editor

Chromium on Engraved Copper

Q.—Please give me any information you can as to the best method to chromium plate an engraved copper plate. My experience has been that the plating always begins at the outer edge of the plate, and works in, the result being that the plating is too heavy on the outer edge of the plate before it has covered sufficiently in the center. Please tell me the reason for this and how the difficulty may be overcome.

A.—In chromium plating such work as yours, where an equal distribution of the deposit is desired, it is best to shield the edges of the work. This can be accomplished by placing a frame around the work or by taking a plate that is about an inch larger than the one to be plated and fastening it as the dummy plate, so that the edges will receive the highest current density.



OLIVER J. SIZELOVE

Aluminum Corrosion-Proofing

Q.—We operate a plant in Sweden. We are trying to find some method of treating aluminum by an immersion process to make it withstand the action of sea water. The work consists of parts for motor boats, and is produced in an aluminum-silicon alloy. An electrolytic method would probably be too expensive. We should prefer a simple immersion process.

A.—There is no immersion method that we are familiar with whereby the aluminum can be made to withstand the action of salt water.

Gold on Army Buttons

Q.—We wish to gold plate buttons for U. S. Army and would like to know how to meet the government specifications, which state that such buttons are "to be plated by the electroplating method with not less than 1½ grains of gold per dozen for 45 line, 1 grain for 36 line, and one-half grain for 25 line." The specifications indicate that these amounts of gold must be on the faces of the buttons only, so that it would seem that it is necessary to avoid deposition anywhere except on the faces.

Can you give us some idea of how to do such work?

A.—If the faces of the buttons cannot be gold plated in some manner before the buttons are assembled, some sort of resist should be applied. Asphalt paint is usually used. It is sprayed on the backs. The faces are then plated, and then the paint is removed with kerosene. Racks are used during the plating process.

The deposited gold can be measured by the use of an ampere-hour meter, which may be obtained from plating equipment makers. (See "Buyers' Guide" pages.) Another means of determining the amount of gold deposited is to weigh the buttons—say one or more dozens at a time—before and after plating. The average deposit will be about the same on each button.

Blue on Steel

Q.—We wonder whether you are in position to advise how to blue screws and tacks that have tungsten plates attached. We want to work at a low temperature and not use a salt or employ a quenching method, but rather a dip. Salt might attack tungsten material and quenching may crack it. We are sending you samples of the screw and tack which we want to blue, and if you can assist us we would appreciate it very much.

A.—To blue small iron parts such as the samples submitted, we suggest that you use a heat treatment method. The method would consist of placing the small parts in a sheet iron drum about two feet long and six inches in diameter. The drum should be rotated over a gas flame and heated to a temperature of 350 deg. to 400 deg. F. When the desired color is produced, the work should be removed from the drum and placed on a table which is covered with an asbestos board, and allowed to cool.

With this method you will be able to produce the color only on steel, but not if the work is zinc or cadmium plated.

Blue Iron Finish

Q.—Is there any solution, acid or alkaline, that can be used hot or cold, in which polished cast iron may be stained or tarnished a blue or blue-black by immersion—something that will not easily rub off?

A.—We suggest that you try the "saltpetre method" to produce a blue finish on the polished cast iron. By this method, sodium nitrate is placed in a cast iron pot and heated until the nitrate is melted. This requires a temperature of about 700 deg. F.

The work should be freed from the polishing grease and immersed in the molten nitrate bath for a few minutes or until the blue color is produced. When taken from the bath and allowed to cool somewhat, the work is placed in hot water to remove the adhering sodium nitrate. It is dried in sawdust and paraffine oil is applied to prevent rusting.

Wear-Resisting Gold Plate

Q.—Please give me a good hard red gold and yellow gold solution for plating jewelry that will not wear off quickly. The solution I use stands washing in the finishing, but the plate wears off after a few weeks' use.

A.—All fine gold deposits are quite soft and, therefore, unless the deposit is quite heavy, will soon wear off.

A karat gold, for instance 14 karat, will wear longer, as the deposit is somewhat harder due to the copper and nickel that the alloy contains.

Prepare your fine gold solution from the formula given on page sixteen of our PLATERS' GUIDEBOOK. A method for operating karat gold solutions is given on pages seventeen and eighteen.

Value of Trade Associations in Times of Depression

By THOMAS R. CHARSHEE

Executive Secretary, National Association of Ornamental Iron, Bronze and Wire Manufacturers, Washington, D. C.

During times of business depression, when plans are being formulated and considered for the rehabilitation of business on a profitable basis, trade association activities are all the more important and should take an even more prominent place in our economic structure. Had there been more serious adherence to the idea of mass minds, associated effort and research during that period leading up to the recent drastic business climax, many of those concerns which are now dead or tried to throw off the death rattle would have thrown up far better defenses against the business depression. While foresight is less common than hindsight, still even to the lay mind it was obvious that the centrifugal force of business was reaching the danger point, and the balance wheel had to be slowed down to keep the business machine within safe limits. Now that the business cycle curve has passed what we hope was the low level, it becomes vastly important that its ascension be plotted upon a sane basis.

TRADE associations can and will play a vital part during this period of reconstruction. They permit the organization of manufacturers and distributors of commodities for the promotion of business by the compilation and distribution of data, publicity programs to expand markets, cost accounting programs, the establishment of codes of trade practices and the co-operative handling of other trade problems and practices. But far better than that, they permit competitive contact and acquaintanceships which go far to remove personal grudges that so commonly exist without a just cause therefor.

Prohibited Practices

Under our present anti-trust legislation embodied principally in the Sherman and Clayton Acts, there are three outstanding practices in business that are prohibited. These apply to the restriction or regulation of production, territorial division by agreement and price fixing by agreement. The latter provision is being given consideration for revision in the Capper-Kelly bill now before Congress. There is also a movement under way to place a more liberal construction on the anti-trust statutes to permit the regulation of capacity and production so as to insure legitimate profits in business. This may call for a complete eradication of the Sherman anti-trust Act. There are other trade practices interpreted by the Federal Trade Commission as trade abuses which are under ban.

The things that cannot be done individually or collectively are regulated by statute. The things that can be accomplished by collective thinking and co-operative effort are almost limitless, and the Trade Association becomes the beacon to which the courses may be set for sailing into the harbor of sound and ethical business relations.

Permissible Activities—Uniform Cost Accounting

One of the highly important phases of trade association work is the development of uniform methods of cost accounting. Either in manufacturing or selling it is fundamental that we know our costs and how to arrive at them with accuracy. It is amazing to learn the number of concerns which have computed their cost and selling price either by mere guess or by haphazard methods. How business today, in the face of keen competition, can go on without a uniform cost accounting procedure which will permit the men of an industry to legally get together and compare costs, is difficult to understand. If one does not know what his costs are, how can one figure his profits?

It is not uncommon for the little fellow, who assumes a low overhead and who depends upon territorial distribution, to establish prices ridiculously low to meet outside competition. His competitors decide to meet his price and so the battle goes merrily on, resulting in profitless sales for all concerned. By the adoption of uniform methods of cost accounting and trade association cost conferences, the interchange of methods and experiences proves invaluable and need betray no secrets of manufacture or sale. Such discussion of operations lead to suggestive methods from which not only individual concerns, but the public at large benefit.

Trade Statistics

Another very important constructive activity of vital importance is the development and compilation of complete and accurate facts and figures indicating trends in business. This may start with raw material and carry through to the buying habits of the ultimate consumer. They may include inventory and movement of commodities in the base industry as well as interrelated industries which affect either the manufacture or sale of the class of commodity an association is primarily interested in. Such statistical information is obtained in various ways—by questionnaire, surveys, reports from members, etc., and correlated so as to bring out its greatest value. It is needless to say that an association is by far a better clearing house for such data than by attempting to maintain a statistical department in individual concerns. In fact there are few concerns which can afford such a department.

Trade Promotion

Trade promotion is another important activity made possible through associated effort. It permits of research in developing every possible use and outlet for commodities; group advertising to promote good will towards industry through catchy slogans and timely or seasonal buying; it effects great saving in buying of printing matter, data books and promotional pieces; it permits the conducting of sales and inspirational meetings among jobber, dealer and consumer groups; it promotes the holding of shows and expositions when the buyer is brought to the seller; it permits of publicity through the press, magazines, etc. These are but a few of the myriad of promotional activities possible through group effort.

Standardization

The Bureau of Standards in Washington has made great strides in standardization and simplification of materials and parts. It is, however, a function of the Trade Association to accomplish standardization and simplification of the assembled product. Industry through this trade association activity alone has saved countless thousands of dollars for their members and the public at large.

Eliminating Patent Litigation

Patent litigation has been one of the expensive luxuries of the manufacturing business. It is a subject that in-

volves such a volume of details and such a diversification of interpretations that a manufacturer is hardly ever sure of his ground irrespective of the caution practiced to avoid infringement. Trade Association activities have been invaluable in keeping suits of this character from court calendars. They have permitted the adjustment of patent differences and the cross licensing of patents through committee work which feature alone has paid in dividends many times the cost for association membership expense. We need only refer to the automotive industry as a concrete example of the effectiveness of control of patent exchange.

Improving Trade Practices

Keen competition has been the parent of many unethical, wasteful and vicious abuses in business practice. That they are within the law made them even more difficult to adjust or eliminate unless by gentlemen's agreement. Codes of business practices in trade associations have placed an effective obligation upon their members which has gone far in obviating the suspicious and underhand methods among competitors. They have set up standards of business morals, which while not always lived up to, furnish a basis upon which constructive criticism can be effectively used. An association that is representative of an industry has a court of appeal in the Trade Practice Division of the Federal Trade Commission which Division when the facts are brought before it can call a trade practice conference of the entire industry. As a result of such conferences, the abuses or practices are grouped and classified to their legal or moral status and the machinery of government is set in motion to counsel the adjustment of the abuses, either by collective agreement or by resort to the courts so that the small and large alike have equal opportunities to weather the maelstrom of competition.

Curbing Price Cutting

Price cutting is a problem of great complexity, very hard to understand, and most difficult to cure. The sustaining cause of the problem is not in the realm of economic or social law; it is in the mental qualities of the price cutting manufacturers of the industry in the form of ignorance, misunderstanding, confusion, greed, distrust and antagonism. The solution of the problem involves the curbing or elimination of these qualities. The penalty for failing to curb or eliminate these qualities is unprofitable operation.

For carrying on the battle against depressed price levels and unprofitable operation, industry is already provided with two very formidable and effective weapons. The first of these is industry education, conducted by the industry for the enlightenment of its members. Campaigns of industry education have already done much to help the situation. The adoption of uniform methods of cost accounting, the publication of industry statistics on stocks, prices and volume, and the determination of definite standards and specifications for products have all served to replace doubt, uncertainty and confusion with definite, understandable facts and conclusions. Industry education of the immediate future, however, should hit more directly at the cause of depressed price levels—at the illusion that competitive price-cutting, either direct or disguised, can ever be profitable. On the foundation laid down in uniform costs, industry statistics, and standard product specifications, this can be done by analyzing one aspect at a time; the various factors involved in price-cutting reasoning, by pointing out the utter futility of this reasoning as a means to greater profits, and by demonstrating the great possibilities which lie in a reversed reasoning and the elevation of price levels. By hammering these indisputable facts home again and again to every member of industry, the present influences on price level, human nature notwithstanding, can be reversed. Price cutting should be discouraged, not on the grounds that it is wrong, but on the grounds that it is futile and foolish.

A second weapon, one still more formidable and effective is provided by the Federal Trade Commission in the trade practice conference. This procedure, a development of the last ten years, provides for the self government of industry on a basis which either coincides with or closely approaches a legal status. It introduces a compulsory factory into industrial affairs which both supplements and increases the good that may be accomplished by industry education alone.

Every industry, large or small, should have its Trade Association, and particularly should industry be fortified with Trade Associations during periods of business depression.

Who Invented the Crimped Wire Brush?

A subscriber writes us as follows:

> In order to decide a dispute, will you kindly let me know through your columns the name of the inventor of the crimped wire brush, and the date of its invention.

THE METAL INDUSTRY has made an effort to answer this apparently simple inquiry, and finds it not as simple as it appears.

There is apparently no data that would indicate the exact answer to the question.

This journal has therefore decided to submit the question to its readers, who are members of the industry which uses most of the crimped wire brushes produced.

The editor will appreciate letters from those who can contribute anything which would aid in determining the correct answer.

Prizes for Metal Industry Articles

AS announced a year ago, THE METAL INDUSTRY will award a prize of fifty dollars for the best article on any phase of non-ferrous metal manufacturing, and a similar prize for the best article on metal coating, published in its pages during the year 1930.

The articles published during the year have been placed in the hands of the committee of judges, and they will shortly render their decisions.

THE METAL INDUSTRY will announce the winners of the prizes in an early issue.

THE METAL INDUSTRY

With Which Are Incorporated
The Aluminum World, Copper and Brass, The Brass Founder and Finisher, The Electro-Platers' Review

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Editorial

Metal Industries Reviewed for 1930. Outlook for 1931

THE results of the year 1930 can be summarized very briefly. They were a disappointment to optimists but not a justification for the extreme pessimists or defeatists who thought that the end was upon us. Those of us who believe in hope and courage thought at the beginning of the year that the worst was over because of the swiftness of the decline late in 1929. We expected an off year. Some of the largest consumers of metals were clearly in for a dull period. Nobody expected automobiles or building to rise. The fact is, however, that they fell off more than they themselves, or even those in authority in Washington, thought they would. Chemical industries which looked for an increase did not get it. Electrical trades expected to equal 1929 but fell a little behind. Even the utilities, the bulwark of copper consumption did not keep up with their expected rate of increase.

Nor was this due to lack of effort. The utilities and the railroads spent more than ever before in new construction and development, in an earnest effort to do their share to hold up operations, but they were not successful. The spring of the year was promising, but the summer less so and the fall and winter altogether disappointing. In spite of the most commendable efforts by the government and the co-operative action of the larger factors in industry, the indisputable fact remains that the year as a whole, and particularly the end of the year, was extremely poor.

A few encouraging factors stood out, however. The electrical industries actually showed gains in certain departments, such as electric ranges, electric fans and electric refrigerators. The marine industry did well. Government construction has begun to get under way and it is estimated that over $500,000,000 will be spent on projects now started. A number of other instances might be cited.

METAL PRICES

Almost without exception the record of the major metals has been reactionary. Copper, starting out at 18 cents a pound, held to this level for about half the year and then dropped precipitously, reaching a low of 9½ and closing slightly over 10 cents per pound. Tin slumped from about 39 to 25 cents per pound. Lead was steady but low, around 5 cents. Aluminum was held at 24.30 until about the middle of the year when it was reduced to 23.30 where it still rests. Nickel was fixed at 35 cents for electrolytic. Antimony fluctuated slightly, but held reasonably near its average, about 7½ cents. Silver was one of our weakest sisters, dropping from 45 cents to about 31 cents an ounce, and platinum, another, falling from $61 to about $30 an ounce.

Without exception all of these basic commodities were affected by world-wide decline in the prices of raw materials. Plans are afoot, however, backed by some of the most powerful factors in international trade, to restrict the production of copper and tin to the levels of consumption, in order to reduce the enormous stocks of these metals which have glutted the market.

TECHNICAL DEVELOPMENTS

It is hardly to be expected that, in an off year, revolutionary technical developments will occur. Nevertheless, 1930 did its share in improving the practice of metal workings and finishing. In the brass foundry, the cupola for melting bronzes with low zinc content made steady progress and has emerged from the experimental stage with a number of commercial installations. Better refractories have been developed for non-crucible furnaces and clay and graphite liners for ladle shells, which are a distinct advance over the past. Automatic material-handling equipment continues to gain. Lead-calcium alloys are now being tested for cable sheathing and seem to be full of promise. Lead-asbestos anti-vibration mattresses under buildings and moving machinery are also attracting wide attention.

One factor, however, which needs more attention and will undoubtedly receive it in the future, is the preparation and handling of molding sands.

Pewter has grown greatly in popularity, providing something of a new outlet for tin. The increased use of electrical refrigerators has developed the electroplating of tin to a high point.

Interest is decidedly active in the precious metal alloys for jewelry, dental work and a variety of industries. Platinum, with its hardeners, iridium, palladium, ruthenium and osmium are being subjected to active experiment.

The electroplating industry is still full of promise. Nickel solutions, with a higher pH (lower acidity) than ever used before have been successfully tried in the General Motors Research Laboratories. Stainless steel (18 chromium, 8 nickel), which earlier loomed up as a serious obstacle to the growth of electroplating is still an important factor, but reports have come back that under continued use in the open air, corrosion appears which did not show up in laboratory tests. If time continues to bear out this fact, the way of plating will be smoother, at least by the elimination of a threat.

According to published papers, there seems to be promise in the deposition of zinc-cadmium alloys; also nickel-cobalt and silver-cadmium alloys. In chromium, an important development is the heat treatment of the chromium plate to make it less porous, thus improving its resistance to corrosion. Also the throwing-power of chromium solutions may be improved by the addition of metal salts such as cadmium, cobalt, nickel and zinc. The General Motors Research Laboratories are responsible for the development of the calcium chloride spray to test the corrosion resistance of chromium deposits, which seems to be more practical than any other spray used at this time. Rhodium and palladium plating are beginning to be heard of.

Plating on aluminum continues to spread due to the improved methods developed by Dr. Work. (See THE METAL INDUSTRY for June, 1928, p. 261-263, and July, 1928, page 313-315.) The anodic treatment of aluminum has also extended its applications and the coloring of such anodic films seems to have the possibility of becoming widespread.

Electrodeposited iron is being used regularly now by the United States Bureau of Engraving and Printing for printing plates, replacing the copper and nickel deposits formerly used.

The new electrolytic pickling processes have been developed for cleaning iron and steel of scale and rust before plating, finishing or other methods of working. (See THE METAL INDUSTRY for April, 1930, page 187, and this issue, page 35.)

A development in anodes, centrifugal casting in chill molds, may, it has been stated by some in the industry,

result in marked changes in anode manufacture.

The American Electroplaters' Society is doing yeoman work in educating its members and the industry as a whole to the need for solution control by analysis, holding evening classes in chemistry and giving laboratory courses in methods of analysis.

The secondary metal industries, in co-operation with technical societies have developed tentative specifications for copper-base ingot metals. (See THE METAL INDUSTRY for October, 1930, page 479-480.) The development of standard methods for analyzing aluminum scrap has been initiated and a survey of secondary copper is in project by the Department of Commerce.

An increased number of installations have been made to recover zinc oxide from brass melting operations. Nickel in old radio tubes and titanium, chromium and molybdenum are making their appearance in scrap aluminum alloys necessitating special care in sorting and varied methods of recovery of the aluminum.

Standardization of products used in the various metal industries is still going forward. An excellent example is that of abrasive grains in which the simplified practice recommendation sent out in June, 1930, has been accepted by a sufficient number of manufacturers, distributors and users to insure the general adoption of the program by the industry as a whole.

The section on Necrology, usually published on these pages, will be found on page 43.

ECONOMIC DEVELOPMENTS

Rolling mills, brass foundries, electroplating plants, smelters, jewelry manufacturers and metal working plants have alike been held down by the existing depression. Depending as they do to such a great extent upon automobiles and buildings, they cannot be expected to return to a high point of prosperity until these industries recover. However, other fields are open to them. Electric power is still extending its sway. Electrical household appliances continue to gain in popularity and increased sales are sure to come with even slightly improved times. Stabilization in prices of raw metals would eliminate one of the most dangerous trouble-makers with which these industries have to contend.

No outstanding extensions of great volume in the fields of copper, tin and zinc have appeared. Lead seems to be feeling its way into such new ground as copper-calcium alloys for sheathing and hard lead for caskets. Nickel is solidifying its high position gained in the last few years and feeling out new openings such as nickel-clad steel, strainers at the bottoms of oil wells, high nickel alloys for condenser tubes, architectural work and plumbing fixtures. Aluminum has made such long and rapid strides in the past that anything it may have done very recently would look small by comparison. Nevertheless, increases in the use of aluminum in furniture, railroad cars, bodies for auto trucks and structural shapes, still stand out as some of the important peaks on the skyline of new applications for metals.

Silver has yet to do much development work but its low price may stimulate new uses, at least, in small quantities. The dead weight of low prices may sooner or later turn out to be the force which will drive metals into fields which they have never been able to enter before. Certainly this is a Metal Age, the quantities consumed being unprecedented in man's history. We have been presented with all-metal airships, airplanes and cars, and now buildings are turning more and more to metals. It may be that the use of a larger proportion of metals in partially depressed industries will tend to overcome the losses occasioned by these depressions.

In jewelry manufacture radical changes may be awaited due to changes in fashions. At this time, the trade is unsettled. The low price of platinum may affect the use of white gold. No one knows at this time whether heavy metal designs will supersede the light lacy filigree work so popular in the past. Yellow gold may come back as a reaction from the flood of white metals and alloys during the past few years. Pewter is still in vogue.

The effect of the tariff seems to be indeterminate as yet, obscured as it has been by the world-wide, as well as American, depression. In metals and metal products the changes were of a minor character, and the growing opinion is that they will not affect us greatly in the long run.

OUTLOOK FOR 1931

Many great reputations have been wrecked on the reefs of prophecy during the past fifteen months. To make definite predictions now would be foolhardy, but we can be guided in a general way by the prospects of the consumers of metals and metal products. Gerard Swope, president, General Electric Company, believes that the new year will be no worse and possibly better than 1930. This is obviously a safe prediction. A. W. Robertson, chairman of the board of the Westinghouse Electric and Manufacturing Company, expects some time during 1931, a general improvement, gradual but enduring. A. E. Dickinson, president, Indiana Limestone Company, says, "In many quarters it is felt that the construction industry will soon provide a real stimulus for general business. A very pronounced increase in actual building activities should be looked for, some time between December and March." The railroad consolidation just arranged will undoubtedly improve the condition and purchasing power of the railroads.

Indications in our own industries also point to emergence from the Slough of Despond. The International Nickel Company has increased its appropriation for research on the uses of nickel, by one-third. Clarence B. White, president, White Brothers Smelting Corporation, predicts several years of the finest and most profitable business for the secondary metal industries that they have ever had. William A. Boesche, president, National Association of Ornamental Iron, Bronze and Wire Manufacturers, points to a gross business in his trade of $250,000,000, and expects a good year in 1931. George T. Ladd, president, United Engineering and Foundry Company, finds that orders for equipment bringing about lowering of upkeep and material costs has been keeping his company busy. He is optimistic, looking ahead into 1931. Leonard P. Ayres, the widely known economist, believes that building, steel and motors are likely to show gains in the spring. C. B. Bohn, president, Bohn Aluminum and Brass Corporation, expects the motor industry to increase operations steadily throughout the year.

We look forward to better times, not because as some feebly plead, they cannot be any worse, but because we want them better and will make them better. We have had depressions before and have risen from them to greater heights than ever. We shall probably have them again unless we discover ways of avoiding them. But we will again recover. America is far from saturated with its products. Its needs are far from filled. Its demands are far from satisfied. We are not a decadent, declining people, but a young, vigorous, hopeful, optimistic and courageous nation. At times this optimism has led us away from the paths of safety, but the same courage has brought us back to the high road. Eventually we will even cure our worst economic disease—unemployment.

We look for 1931 (our own twenty-ninth year), to lead us, perhaps not to the heights, but certainly upward.

Correspondence and Discussion

What Is Happening in the Electroplating Industry?

A Letter From One of Its Former Outstanding Leaders — A. P. Munning

To the Editor of THE METAL INDUSTRY:

It is a pleasure to comply with your request and give you the passing impressions of the electro-plating and metal-finishing industry as viewed by one who has ceased to be actively engaged in it, but still retains his appreciation of the industry and those many friends whom he learned to work and associate with during twenty years of service to it.

A. P. MUNNING

No Revolutionary Technical Developments

The year 1930, in my opinion, showed no revolutionary changes in the accepted methods of electro-plating, the application of materials, or new processes in the art. The use of stainless steel developed a new field of vast importance to the industry, which should become greater as the years roll on, but no novel way has as yet been observed by the writer to handle this particular problem. Old methods have been bettered in the design and use of automatic machinery for the handling of materials in processes of plating, and newer types of grinding and polishing machinery have been placed on the market, which are better than their predecessors, but based largely on perfection of older ideas, rather than on any radical change in methods or design.

The use of chromium has, of course, increased materially, and the knowledge of how to handle it has benefited the use of nickel to a large extent, since nickel plating had to be applied in a more scientific and better manner in order to make chromium much more adaptable as a coating than it had been in previous years.

I cannot find wherein the art of plating has had much new development, because we know of no outstanding achievement (so radical, for instance, as the introduction of chromium in previous years), nor do we see development along other lines of a radical nature, but rather a strengthening of the position in the plating art of methods which had been known and were in an embryonic stage. Consequently, in the art of plating, our opinion is that 1930 solidified our knowledge and gave the opportunity of perfecting what had been more or less known previously.

General Technique Improved

It is gratifying to watch the growing improvement of technique in the industry, from the viewpoint of the scientist, plater, and manufacturer. The chemical side is predominating, and will continue, in my opinion, to do so.

No one can help being impressed with the increased knowledge of the platers themselves, due largely to the American Electro-Platers' Society gatherings and meetings, and to their excellent application to their own problems, supplemented by the papers of scientists and technical men, etc. Practical work goes hand in hand with science. All connected with the art of plating now realize that it is a scientific process and needs for its fruition the combined results of technique, chemistry, and a knowledge of the art, rather than the old rule of secrecy and guesswork which prevailed in the past.

It seems to me, therefore, that the American Electro-Platers' Society is to be congratulated for furthering this good cause and concentrating and solidifying what has been learned about the art, in their meetings, papers, and discussions. Such work is bound to benefit increasingly the art and the ability of the men who participate in such progress.

Polishing and Finishing Should Be Fostered

The plating art, it seems to the writer, has progressed faster in the past twenty years than the finishing art, that is the polishing of surfaces economically and efficiently. This is probably due to the fact that more intensive thought has been placed by scientific societies on the art of plating, and that the art of finishing, which may have far greater ramifications and applications than plating, has been more or less neglected. During 1930, however, many companies have turned their attention to finishing problems, and have gotten out machinery for surfacing metals, preparatory to plating, which have materially increased the efficiency and rapidity, and decreased the costs.

This, to the writer's mind, is a very prolific field for future development, and would be greatly enhanced by a Society similar to that in the plating art, to study and work on the basis of technical knowledge for finishing problems.

There are enough concerns in this industry today to form such a Finishing Engineers' Society, and there are enough engineers who would welcome it to make it an outstanding contribution to the art.

Economic Aspects

From a manufacturing point of view, the writer has held consistently over a period of twenty years that this industry is obsessed with the idea of volume, rather than quality and profits. It would immeasurably benefit both manufacturer and consumer if on the one hand, the manufacturer would think more of quality and the consumer less of price. It is much better to manufacture $500,000 worth of material per annum at a net profit of 5%, than it is to manufacture $1,000,000 worth per annum at a profit of 2½%. The manufacturer has less worry, the consumer gets better attention and material. Eventually the manufacturer is obliged to make what the consumer demands in the standard lines, so that the consumer only gets what he pays for in the end.

The insistent demand of certain concerns for more volume, rather than more profits (and by "profits" I mean a very nominal profit compared to other lines) does not help the situation in any way. The writer has always found that where consumers are getting a good product and all are paying the same price, they are happy and will continue so. They are better off than if they were shopping from pillar to post and getting in the end just what they pay for and no more.

It has been consistently true that for the amount of money involved, the time spent, and the labor taken, this business has not been a remunerative one for the manufacturers as a class. It is only those who have adapted themselves to furnishing material of the highest grade, at a price just above the cost of production, who have been able to survive in the long run, for the difference between the market price and cost is very small indeed, and not commensurate with the worry and risk attendant upon such a line of manufacture.

In fact, I believe that if the Department of Commerce were to analyze various businesses engaged in the manufacturing and selling of plating and polishing supplies, they would find that for the capital and labor involved, together with the size of plants, etc., the profit for these manufactures is lower per dollar of sales than in any other business of a similar magnitude in the United States.

Distribution Costs High

One of the principal costs to manufacturers of plating and polishing materials is their cost of distribution. The writer, six years ago at a meeting in Buffalo, read a paper on this subject before an assembled body of manufacturers, and pointed out that the cost of distribution would in the future determine largely

the net result on the balance sheet. Not much attention was paid to this prediction at the time, nor has it been since, but the prognostications have proven correct. Today, due to the lack of knowledge of proper distribution, the manufacturing industry in this particular line is not as prosperous as it would otherwise be. It is my firm conviction that a study of this situation, which means the difference between the cost of the product when it leaves the factory door, and the return of the dollar for its sale into the bank, will prove very illuminating.

Ethics

The question of ethics and the relationship between manufacturers and users and among manufacturers themselves, is of paramount importance in any industry. I feel that too much stress cannot be laid on this particular point, and I also feel that this has not been materially strengthened during 1930. Naturally, in an off year, it is more difficult to get on the common ground of good ethics than in prosperous times, but certainly the groundwork for such a policy has been worked upon consistently during the past twenty years, and it is saddening to see the retrogression, rather than a forward movement on the basis of fair play and honest efforts by all concerned.

If we had the vision to have an outstanding physical laboratory, an outstanding scientific laboratory, an outstanding workshop laboratory, cooperatively operated and controlled by the various manufacturers in this line, hundreds of thousands of dollars would be saved, not only to the manufacturers, but also to the consumers; the material itself would be standardized and better than it is today, and there would be less worry on the part of executives in trying to bolster up an individual situation, when in reality what is needed is the concerted common effort of all towards these goals.

Better Times Ahead

The year 1930, with all of its attendant evils, is behind us. These evils are nothing compared to the lessons which they should have taught us. The only real evil was poor business, in other words, a loss in production, which should have been and has been in some cases predetermined to a point where it was taken care of. In its place, good will, common effort, better methods, better ideas, better products were sought and are being brought out. There is no question that the sun will rise again and bring us back to even greater peaks of prosperity than we have had. In the writer's opinion, however, this will be a very gradual growth, and in order to be permanent it must be founded on constructive work. In order to benefit the industry this constructive work must be founded upon co-operation of all of the persons engaged in it.

In analyzing the history of the larger companies in other fields, and in analyzing their industries, we find that they all enjoy cooperative association and become greater by a diffusion of common ideas for the common good. It was not until such actions were undertaken that other industries became great in comparison to ours.

Hence, I bespeak good will, toleration, common ground, and common forward movement, to bring our industry to even greater heights than it has yet achieved. Such common ground, coupled with vision and fairness, will redound to the benefit of everyone in the industry or connected with it—the scientist, the plater, the employers, and the manufacturer. I hope that 1931 and the succeeding years will be brighter and make for more of these benefits to everyone connected with the industry.

New York, N. Y. A. P. MUNNING.
December 20, 1930.

New Books

The Metallurgy of Bronze. By H. C. Dews. Published by Isaac Pitman and Sons, New York. Size 5½ x 8, 147 pages. Price $3.75.

This book, written by the metallurgist of a large London company, give a comparatively brief summary of the proved knowledge of bronze at this time. The work is not intended to be all-inclusive or to collect the large mass of detail which is in print; neither does it stress many of the metallurgical theories. It does, however, blanket the subject discussing equilibrium diagrams, cast structures and the physical properties of bronzes in general. Chapters are devoted to phosphor bronzes, and zinc bronzes; also to the effect of minor constituents, such as lead and nickel. Practical considerations are given weight in chapters on the effect of gases, casting temperatures, bronze foundry practice and segregation and liquation.

A List of Alloys. Prepared by William Campbell for American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa. Size 6 x 9; 65 pages. Price, paper bound, $1.50; cloth, $2.00.

This is a revision and amplification of the list which Professor Campbell prepared in 1922, and includes, in addition to the chemical compositions, the physical properties of some typical alloys. The list has proven of great value as a reference to a vast number of alloys which have names not easily recognized, and for those needing such a reference, it is the only available source. It represents the concise result of a great deal of effort. Professor Campbell is chairman of the Society's Committee B-2 on Non-Ferrous Metals and Alloys.

Chemical Engineering Catalog. The fifteenth annual edition. Published by the Chemical Catalog Company, Inc., 419-4th Avenue, New York. Size 10 x 11, 1168 pages. Price $10.00, except to those engaged in the chemical industries, to whom it is loaned free or sold for $3.00 a copy. This catalog is a standard institution in the chemical industries, placing in the hands of the reader a reference book of equipment, raw materials, literature and general information. The 1930 edition contains additional technical data and a more complete index.

Principles of Electroplating and Electroforming. By Blum and Hogaboom. Published by McGraw-Hill Book Company. Price $4.50. This standard work is now in its second edition and has had a remarkable sale. The first revision was exhausted in three months, and another printing is being arranged for.

Technical Papers

Seams for Copper Roofing, by K. Hilding Beij, Bureau of Standards. Superintendent of Documents, Washington, D. C. 24 pages, 9 x 6; price 15 cents. This is Research Paper 216, reprinted from Bureau of Standards Journal of Research, Vol. 5, September, 1930. Abstract:

The various types of seams which have been proven by experience to be suitable for copper roofing are described. The ribbed or batten, the standing and the open-lock types give rise to no difficulties, if properly made, and, therefore, no tests of these seams were necessary.

While flat lock-seams calked with white lead and linseed oil have given very satisfactory service in the past, a quantitative measure of the water-tightness of these seams is desirable. Leakage tests showed that calked seams can be used wherever the depth of water which may be standing for several days on the roof will not exceed 4 inches, a depth rarely occurring except in gutters. A small section of seam removed from a roof after many years of service stood continuously for 45 days under 12 inches of water without any signs of leaking.

Tensile tests of one-half-inch flat lock and of lap seams yielded the following results:

1. Seams made with resin, killed acid, or a commercial "prepared" flux are equally strong.

2. Seams made parallel to or transverse to the direction of rolling of the copper are equally strong.

3. The strength of lap seams, one-fourth to 1 inch wide, is proportional to the width.

4. On one-half-inch flat-lock seams a large increase in the amount of solder used results in only a small increase in strength.

5. Pretinning by dipping the edges of the sheets to be joined in solder or tin increases the strength very greatly in the case of flat-lock seams.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

Metallurgical Foundry, Rolling Mill, Mechanical

H. M. ST. JOHN — W. J. PETTIS
W. J. REARDON — P. W. BLAIR

Electroplating, Polishing, and Metal Finishing

O. J. SIZELOVE — A. K. GRAHAM, Ph.D.
G. B. HOGABOOM — WALTER FRAINE

Aluminum for Lighting Fixtures

Q.—We are manufacturing high grade lighting fixtures and would like you to give us a formula for an aluminum alloy with a low melting point which can be poured in regular bronze molds.

A.—There is no aluminum alloy with a low melting point. The melting point of aluminum is about 1150° Fahrenheit. For an alloy to give the desired results we would suggest a mixture of 90% aluminum and 10% copper.

Make an alloy of 50 copper and 50 aluminum; stir well, pour in ingots, and use as follows: melt 80% of aluminum and add 20% of alloy.

This mixture casts well in bronze molds if the gating is properly taken care of and is suitable for such alloy. The gating practice is somewhat different from that used with a tin-lead white metal alloy.—W. J. R., Problem 4,045.

Clock Dial Finish

Q.—We are sending you one of our clock dials. Can you tell us how we can duplicate the silver finish on this dial, and what equipment we would need in order to do it?

A.—The sample clock dial was finished in the following way: The surface of the metal was freed from grease and the design produced by the transfer process, after which it was etched with an iron perchloride solution. The surface was then sprayed with black enamel and the transfer paper removed. This leaves the design in black. The next operation consists of producing a matt surface, which is done in a sulfuric acid and sodium bichromate dip. It is then silver plated, scratchbrushed and lacquered.

The necessary equipment would consist of a transfer process, spray equipment, plating equipment, and an operator who thoroughly understands the process.

Unless you have a large quantity to make it will be cheaper to buy them than to make them yourself.—O. J. S., Problem 4,046.

Foundry Sand

Q.—Please advise where I can obtain foundry sand suitable for casting brass and aluminum. We operate a small foundry in the middle west and want sand that will give the best results.

A.—We would suggest that you get in touch with some of the foundry supply houses advertising in our pages. (See "Buyer's Guide.") They carry sand suitable for brass and aluminum castings. We are sure you will find one which can take care of all your requirements.—W. J. R., Problem 4,047.

Hot Dip Galvanizing

Q.—We are planning to produce parts for electrical construction, and these parts require a hot dip galvanize. Will you kindly give directions for cleaning the work, preparing the solution, temperatures, etc.? Please specify the required equipment and any other necessary details.

A.—Pole line hardware is one of the most difficult lines of work for the hot galvanizing industry. This is due to the thousands of different kinds of articles that are zinc coated. Most of this work, or at least a large amount of it, is covered with oil, due to threading, cutting, etc. It is, therefore, first necessary to clean the work in a good commercial cleaner. After cleaning, the articles must be pickled. Due to the different kinds of scale found on the articles, different strength sulfuric acid pickles are used, but an average strength would be 4 to 6% at 160 to 180 deg. F. The pickling temperature should never be over the high limit, and the acid should be tested from time to time to see that it is the proper strength.

After cleaning and pickling, the work is put in either a muriatic acid dip or through a liquid flux of zinc ammonium chloride. Some operators prefer one and some like the other better. The work is then dried and is ready to be coated. Usually the set-up has an overhead monorail and the work slides over by trolley into the bath.

The bath is held at different temperatures, depending upon the kind of work, the size of the pieces, and the production going through the bath in a given time. An average temperature would be between 850 and 865 deg. F. It is best to keep to the low side. After the work has been coated it is drawn to the surface, dusted with sal-ammoniac, and slowly withdrawn from the bath, and then lowered into a tank of warm cooling water. This is to set the coating and keep it from running and becoming uneven. It also prevents the coating from burning white in the air.

Either cypress or acid-proof brick tanks can be used for holding the solutions.—W. G. I., Problem 4,048.

Lead Reclaiming Equipment

Q.—We are interested in equipment for reclaiming battery lead, and would be pleased to have your recommendations as to the best apparatus for such work.

A.—We recommend the use of a blast furnace for this work, and by letter we are advising you of the names of some firms manufacturing such furnaces. The makers of such equipment can give you a great deal of information relative to operation. Refer to us again if you have any difficulty either in getting equipment or in operating it.—W. J. R., Problem 4,049.

Matrixes

Q.—I have tried to make lead matrixes, but have failed, and wish you to help me. I used plaster of paris molds (sufficiently dried, of course) shellacked, oiled, and before pouring the lead, the mold was heated as much as it could stand. The work came out every time with numerous air holes. Must I use different molding material, and what is the procedure?

The object is to make a disk 8 inches in diameter, with symbolic reliefs and letterings, in copper, something like a large medallion. The deposition process I have mastered. I want to use lead matrixes instead of plaster, to save the metalizing work. I need only a few, and wish to save the expense of having them made.

A.—We would suggest that you first plate on the plaster and make a copper mold, backing same up with aluminum, and pour your lead in the copper mold. If this is not your idea, we suggest you make a mold in plaster and mold a bronze mold from your

plaster, using a mixture of 90% copper and 10% aluminum. If you are careful in molding the bronze mold, very little work will be required to finish it up.

Lead is best poured in metal molds for such work. Plaster molds for lead castings are never satisfactory.—W. J. R., Problem 4,050.

Pickle for Galvanizing

Q.—As subscribers of your magazine, we would appreciate if you would assist us with the following problem:

We are electro-galvanizing black conduit pipe for the electrical trade, and we are having some trouble with the pickling. We are using a solution of half water and half muriatic acid, 18 pounds in a 500 gallon wooden tank. After taking the scale off about 6,000 feet of ½" pipe, this solution becomes flat, and as this 6,000 feet represents one day's work, we consider that we are not getting very much efficiency from this pickle. We leave the pipe in this solution for about 2½ hours per batch, and even then there are spots of scale left on the pipe, which requires another spell in the acid. We find this method slow and rather expensive, and would appreciate your assistance with this problem.

After removing the pipe from the acid pickle, it is racked up on a horizontal rack. It is then rubbed by hand with powdered pumice on a cloth. While this rubbing process is going on the tubes are oxidizing to such an extent that we have to dip them, rack and all, into a mild (15%) solution of muriatic acid. What we would like to know, however, is whether you could give us a solution in which we could keep a quantity of these pickled tubes ready to be racked and plated without having the tubes oxidized. It could of course be left over night in this mild solution, but even then this solution would be too strong on the pipe-threads.

A.—It would seem to us, from the amount of acid used to prepare the 6,000 feet of pipe, that you have quite an expensive method.

Sulfuric acid is generally used in place of muriatic acid in pickling large volumes of work, on account of the cheapness of the acid. The action is somewhat slower, but if agitation and heat are used the results are satisfactory. We suggest that you use a sulfuric acid pickle made of one pound of acid to each gallon of water; use at 120° F., and agitate either the pickle or the work. Intermittent exposure to the acid and the air is also beneficial.

The length of time that the work should be left in the pickle will depend upon the thickness of the scale, but an hour should be sufficient. To prevent the work from rusting during plating operations, we suggest that the acid be neutralized in a trisodium phosphate or sodium carbonate solution made of 2 ounces of either of the salts mentioned to each gallon of water.

The work, after pickling, should be rinsed in cold water and then placed in the neutralizing solution. It can be taken from here and scrubbed and may be replaced in the neutralizing solution until needed for plating.

O. J. S., Problem 4,051.

Pitted, Streaky Copper Plate

Q.—We are sending you sample of our copper plating solution. Will you please analyze it and let us know what is wrong with it?

This solution has been giving us trouble. It pits and streaks badly, and these defects will not buff out. We have plated at different amperages without any improvement.

A.—Analysis of copper solution:

Metallic copper	5.97 oz.
Free cyanide	0.33 oz.
Carbonates	2.47 oz.

The solution is quite high in metal, and the free cyanide is too low. We suggest that you add to each gallon of solution 2 ounces of sodium cyanide and 2 ounces of carbonate of soda. Operate solution at a temperature of 110° F., with a cathode current density of 10 to 12 amperes per square foot.

O. J. S., Problem 4,052.

Pitted Copper Plate

Q.—We are having some trouble with our copper solution pitting, and being subscribers to your publication we are taking the liberty of forwarding you a sample of this solution, which we will be glad to have you analyze. Please advise as to results of the test.

For your information we wish to say that there seems to be a black scum which forms on the anodes when the tank is idle, but which readily breaks loose when plating is started. We have 300 gallons of this solution, and the anodes are 50% cast and 50% electrolytic.

A.—Analysis of cyanide copper solution:

Metallic copper	4.31 oz.
Free cyanide	1.35 oz.
Carbonates	2.56 oz.

Analysis shows that the solution is quite concentrated. We suggest that you take from the tank 100 gallons of the solution and replenish with water. If this does not stop the pitting it will be necessary to agitate the cathode. Operate the solution at a temperature of 110° F., with a cathode current density of 10 to 12 amperes per square foot.

The black coating that forms on the anodes is probably due to the use of hyposulphite of soda as a brightener. Avoid using an excess of this salt. O. J. S., Problem 4,053.

Silver Solution Analysis

Q.—Will you please analyze this silver solution as to its metallic contents, free cyanide, and any other properties. (Sample accompanied letter.)

A.—Analysis of silver solution:

Metallic silver	0.97 oz.
Free cyanide	3.85 oz.
Carbonates	8.69 oz.

Analysis shows that the metal content is quite low. The carbonate content is quite high. We suggest that you add to each gallon of solution 2 ounces of silver cyanide and 4 ounces of sodium cyanide. O. J. S., Problem 4,054.

Water for Plating Solutions

Q.—We are sending you two samples of tap water for examination. No. 1 is water that has been through a purifier to remove iron oxide and other impurities. No. 2 is a sample of the water we use for making up our plating solutions, and for rinsing the work plated.

Can you tell us what reaction we should get from using the water as in No. 2 sample? Would you advise us to use purified water, such as sample No. 1?

Can you tell us if water treated with a commercial softener has an advantage over hard water for plating solutions?

A.—Analysis shows that both samples of water contain a small quantity of sulphates and a large quantity of chlorides. The alkalinity of the water is also very great as sample No. 1 has a pH of 5.8, and sample No. 2 a pH of 6.4.

We would not advise using water from either sample in making or replenishing any plating solutions.—O. J. S., Problem 4,056.

Testing Silver

Q.—I would like a formula for testing silver. We handle many kinds.

I believe there is a solution that turns red on certain silver, probably a low grade. There is difficulty in ascertaining different alloys by the ordinary nitric acid tests.

A.—There is no simple qualitative test that I know of whereby different alloys of silver and other metals can be determined with any degree of accuracy.

It will be necessary to have a complete quanitative analysis made to determine the different alloys.—O. J. S., Problem 4,055.

Patents

A Review of Current Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,781,789. November 18, 1930. **Chromium Plating.** John F. K. McCullough and Benjamin W. Gilchrist, Detroit, Mich., assignors to Ternstedt Manufacturing Company, Detroit, Mich.

In a chromium chloride plating bath, the incorporation of an addition agent in said bath which combines with the hydroxyl ions for the purpose of preventing the deposit of chromium hydroxide on the work.

1,781,791. November 18, 1930. **Electroplating Machine.** Constantine G. Miller, Chicago, Ill.

In a plating machine, a supporting structure comprising spaced end columns and an intermediate structure, a continuous loop shaped trough extending between said columns and located in a substantially horizontal plane, an endless conveyor movably mounted in said trough comprising spaced upright pins, article carriers removably supported on said trough, each comprising a shoe having a slot therein for receiving one of said upright pins.

1,782,092. November 18, 1930. **Articles Having Tarnish-Resisting Surface and Process of Making Same.** Daniel Gray and Richard O. Bailey, Oneida, and William S. Murray, Utica, N. Y., assignors to Oneida Community, Limited, Oneida, N. Y.

The process of providing an article with a tarnish-resisting coating comprising a mixture of silver and chromium, which consists in preparing an aqueous bath containing at least 3 per cent chromic acid, and a compound of the silver, using the article to be coated as a cathode, passing a plating current through the solution by means of a suitable anode, and maintaining an excess of said silver salt in contact with the bath.

1,782,300. November 18, 1930. **Aluminum Alloy.** Horace Campbell Hall and Tennyson Fraser Bradbury, Derby, England, assignors to Rolls-Royce, Limited, Derby, England.

An aluminum alloy formed by compounding the elements, and that in relative quantities respectively within the ranges set out below:—copper 0.5 to 5.0 per cent of the whole, magnesium 0.1 to 1.7 per cent of the whole, nickel 0.2 to 1.5 per cent of the whole, iron 0.6 to 1.5 per cent of the whole, silicon .55 to 2.8 per cent of the whole, titanium up to .3 per cent of the whole, manganese up to .3 per cent of the whole, aluminum the remainder, only traces of other elements.

1,782,359. November 18, 1930. **Electric Melting Furnace.** Franz Linnhoff, Eberswalde, Germany, assignor to Ajax Electrothermic Corporation, Ajax Park, Ewing Township, N. J., a Corporation of New Jersey.

In an electric furnace, a furnace shell having upper and lower charge receiving portions, heat insulation about the upper portions, a furnace inductor about the heat insulation, connections for supplying current to the inductor, a furnace resistor surrounding the lower portion of the furnace having relatively high resistance and correspondingly low inductive effect, heat insulation about the resistor confining the heat of the resistor against the furnace shell and connections for supplying electric current to the resistor.

1,782,614. November 25, 1930. **Electrodeposition of Metals.** Jack Hollins, Rosemount, Middlewich, England, assignor to Imperial Chemical Industries Limited, London, England, a British Company.

A vat for the electro-deposition of metals comprising, in combination, an anode compartment, a cathode compartment, a filter diaphragm between the said compartments, a rotating head above the cathode compartment, mandrels constituting cathodes suspended from said head and extending into the cathode compartment, means for rotating said mandrels about their axes, a vertical perforated tube extending up through the cathode compartment, connected to the rotating head at its upper end and providing a steady for the lower ends of the mandrels, and means delivering electrolyte within said perforated tube through which it diffuses into the cathode compartment to overflow the filter diaphragm into the anode compartment.

1,783,139. November 25, 1930. **Alloy.** Charles Philippossian, Geneva, Switzerland.

A white alloy comprising the following elements in the following proportions:

	Per Cent		Per Cent
Cu	66.554	Mg	0.190
Ni	18.2	Cd	0.098
Zn	14.5	Si	0.078
Al	0.190	Mn	0.190

1,783,188. December 2, 1930. **Method of Coating Metal Articles.** James S. George and Roger S. Sperry, Waterbury, Conn., assignors to Scovill Manufacturing Company, Waterbury, Conn.

The method of coating articles with lacquer or the like, which comprises submerging the articles in a bath of the coating material, withdrawing the articles from the bath at a rate of emergence substantially the same as the rate of drain of the lacquer from the emerging articles, rocking the articles back and forth across the horizontal after complete withdrawal from the bath to periodically reverse the direction of drain of the lacquer on the articles, and drying.

1,783,663. December 2, 1930. **Etching Precious Metals.** James C. McFarland, Fort Thomas, Ky., assignor to The Wadsworth Watch Case Co., Dayton, Ky.

The method of etching precious metals, which comprises: applying to the surface of the metal a chromium plating adapted to serve as a resist to the etching fluid for the precious metal; etching the exposed surface of the precious metal while said plating design serves as a resist; and removing the chromium plating.

1,783,770. December 2, 1930. **Process of Improving the Resistance to Corrosion of Articles of Magnesium and Magnesium Alloys.** Adolf Beck and Gustav Siebel, Bitterfeld, Germany, assignors to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany.

The process of improving the resistance to corrosion of articles of magnesium and magnesium alloys containing at least about 8% magnesium, which comprises treating same with a boiling aqueous solution of dichromates for about an hour at least.

1,783,885. December 2, 1930. **Apparatus for Electrolytically Depositing Metal on Metal Tubes.** Francis Grimshaw Martin and William Ramsey, Birkenhead, England, assignors to J. Stone & Company Limited, Deptford, England.

In electrolytic apparatus for carrying out processes of the kind referred to, the combination of a tank, a cathode frame comprising end rings and a series of intermediate perforated rings, gripping devices associated with said intermediate rings adapted for frictionally engaging tubes inserted into the perforations of said intermediate rings, flexible anodes arranged between the top and bottom rings.

1,784,106. December 9, 1930. **Coating Zinc and Cadmium.** Aladar Pacz, East Cleveland, Ohio.

A non-alkaline dipping solution for zinc and cadmium articles containing a soluble molybdate and a second soluble salt, such second salt being one which is not alkaline and does not precipitate molybdenum.

1,784,490. December 9, 1930. **Process for the Recovery of the Tin Contained in the Residues of Tin-Plate Manufacture.** Jehan Laley, Hayange, France, assignor to Les Petits Fils de Francois de Wendel & Cie., Paris, France.

A process for the recovery of the tin contained in the residues of tin plate manufacture of the class referred to, which consists in causing a basic liquid in the hot state to act upon the oil and other impurities contained in said residues, in separating by screening the sludge from the tin and impure tin alloy which result from said treatment, and in treating separately the tin and impure tin alloy on the one hand in a furnace, and the sludge on the other hand by reduction in a furnace.

Equipment

New and Useful Devices, Metals, Machinery and Supplies

Electrolytic Bright Dip for Removing Scale from Steel

A new process for removal of scale formed on steel by such operations as rolling, forging, tempering or annealing has been developed by the Hanson-VanWinkle-Munning Company, Matawan, N. J., who call their new development the "Hanson-Munning Electrolytic Bright Dip." The method is an electric pickle in which the steel is treated in an acid bath as a cathode, and in a second acid bath as anode, with a water rinse between. The combination of cathodic and anodic treatment, the company believes to be a totally original idea, with the major advantage that the work comes out bright and clean. Consequent reduction of grinding and polishing in preparation for plating, with the possibility of using finer grained wheels, is said to be an important advantage to platers who finish scaly steel work. Many other applications are possible, it is stated, such as preparation for galvanizing, and other finishes; for removing scale in shops where the hard scale tends to injure or wear out machinery used to work the steel; cleaning pipe; removing complex oxides from alloy steels of various kinds; and numerous others.

The process consists, briefly, of dipping the work in a caustic electrolytic cleaning bath to remove grease, a water rinse, then as cathode in the hot No. 1 bath which operates with current density of 60 to 100 amperes per square foot of work surface. This reduces the scale to a black residue composed chiefly of iron carbide. After rinsing in water, the work is transferred to the No. 2 bath, where it is arranged as anode, with current density of 150 amperes per square foot. In this bath all residue is removed and the surface of the metal becomes bright and chemically clean. It is then dipped in hot sodium carbonate solution to neutralize the acid, then placed in hot water rinse. The complete process is said to require only about 10 per cent of the time taken by ordinary pickling, on the average, and to consume a minimum of acid in producing its results. The No. 1 bath can be operated about one week, or 144 hours, without renewal, and the No. 2 bath about a month, according to the company. Size of solutions required is said to be reduced about one-half as compared with ordinary pickling. With varied current densities the process can be applied to all classes of work. The rapidity of action makes inhibitors unnecessary, there being no appreciable loss of metal. No fumes are generated by the solutions. Hydrogen embrittlement is said to be eliminated in all work except highly tempered steel with thin sections, like springs and hacksaw blades, and work of this kind is embrittled in ordinary pickling also. The embrittlement that cannot be prevented is overcome by boiling in water for a few minutes, or by baking at moderate temperature, after scale is removed.

The process can be operated with full-automatic or semi-automatic equipment. The Hanson-VanWinkle-Munning Company has applied for a patent on the process and plans to license manufacturers to use it in their own plants.

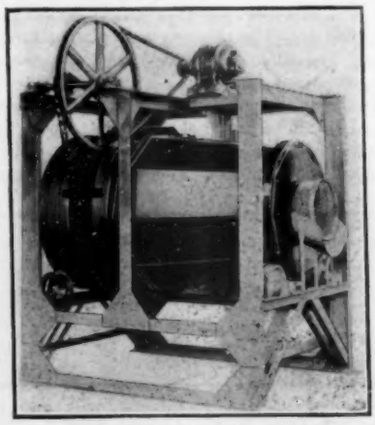
Attention is called to the fact that the process is not applicable to certain classes of work. These include thin steel sheet, strip and wire unable to carry the current required; steel, iron or malleable castings which have a "skin" containing silica inclusions caused by casting in sand molds, since the acid used will not attack this silica. Difficulty is encountered in certain work having deep recesses, necessitating inside anodes at times, for best results.

Important savings are possible, however, wherever the process is applicable, since it reduces not only the time and materials consumed, but the labor and overhead in general, it is pointed out. Particular attention is called to the fact that it will clean pipe on the inside as well as the outside with a minimum of difficulty.

New Burnishing Machine

The development of modern ball burnishing has had an important effect on the manufacturing cost of countless metal products. Where parts were formerly polished one at a time by hand, now batches of from 100 to 100,000 are ball burnished, resulting in a tremendous saving of time and labor. Now it is claimed that an improvement makes possible a 50% reduction in the cost of ball burnishing on quantity production by complete elimination of the labor of rehandling the balls. N. Ransohoff, Inc., Cincinnati, Ohio, announces a new product, the "Ideal" ball burnishing barrel. The work is charged into this barrel, in which there is the proper quantity of balls. Rotating the barrel in running direction gives the work a perfect burnish, it is stated. The work floats in the charge of balls and is unmarred.

After the burnish is complete, the operator reverses the barrel, which discharges the work and the balls into a cylindrical screen passing through the center of a metal cone. Here work and balls are automatically separated, the work passing out at the end, the balls passing through the screen to be retained in the metal cone. Fine screen patches on the cone carry off soap solution. Again rotating the barrel in running direction automatically returns the balls to the burnishing chamber, ready for the next batch of work. When balls weigh as much, or twice as much, as the work itself, the labor saved in handling them is important.



Improved Ball Burnisher

The barrel is ten-sided; sides and charging end are of 3″ maple; diaphragm between burnishing section and cone is bronze; the screen is bronze. The barrel has a diameter greater than its length, a design which is said to increase its burnishing efficiency. It runs on chilled rollers which rotate in Hyatt roller bearings. The motor is provided with a V-belt drive.

New Rouges for Pewterware

Several new types of rouge composition for polishing and finishing pewterware have been placed on the market by Zucker Sons' Company, Inc., 627-629 First Avenue, E. Roselle, New Jersey. This company manufactures the "Pioneer" brand of rouge and composition.

The manufacturers state that the new products have been developed especially for finishing pewterware, due to the growing popularity of products made of pewter. The rouges are prepared for semi-finishing as well as final coloring. Samples for trial are offered and readers may obtain these and full information by addressing the Zucker company.

Automatic Plating Machines in the Jobbing Plant

"While a large manufacturer can often afford to operate his plating department at a very low margin of profit or even 'in the red,' making up his profits from economies in other departments, the jobbing plating shop must operate at a profit or go out of business," says H. S. Sandberg, president of the Great Lakes Plating Company, Chicago, Ill.

"It is only human to observe that a manufacturer will sometimes accept a quality of work from his own plating department which he would promptly reject if it came from an outside concern.

"Thus, we platers can continue to exist only as long as we are able to prove to manufacturers, day in and day out, that we can plate their products better, quicker and cheaper than they can themselves.

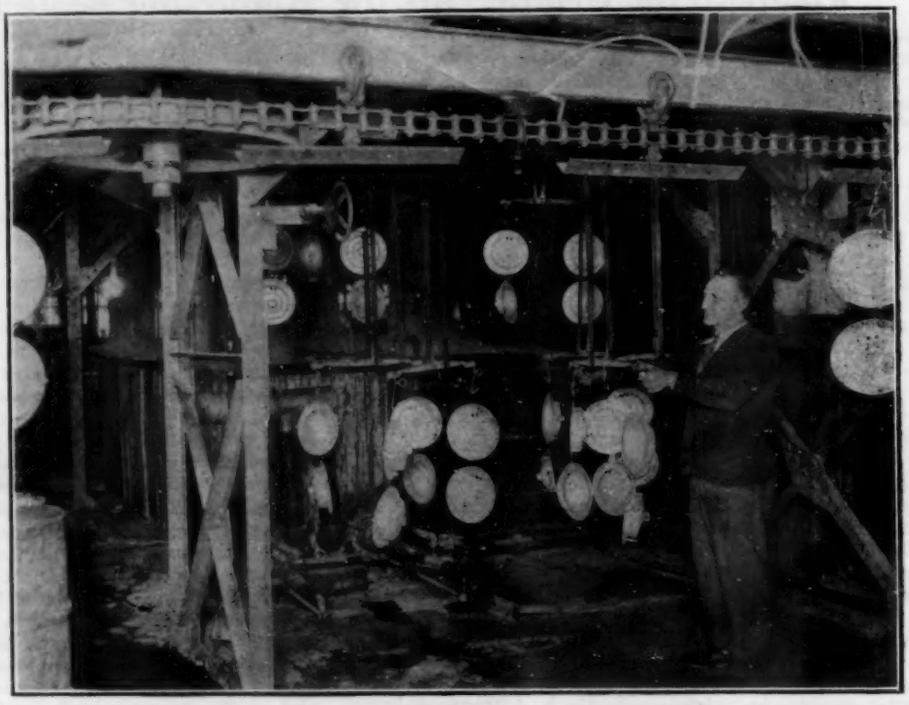
"And yet," concludes Mr. Sandberg, "those who plate for a living and must make every job show a profit seem most reluctant to use automatic machinery in face of the ever increasing evidence that the use of such equipment will increase their profits."

While the volume of business done in some plating jobbing shops may not warrant as large expenditures for equipment as are justified in big manufacturing plants, still, better results and better profits may be obtained in small shops too, by using full automatic plating equipment of the right design in conjunction with semi-automatic or variable speed plating machines and other standard equipment.

As for those shops handling a great variety of products of all shapes and sizes, the advantages gained through use of a Meaker full automatic return type nickel plating machine on this class of work are stated by the Great Lakes Plating Company.

Some three years ago this organization decided that demand for more rapid production and lower costs, coupled with necessity for maintaining the high standard of their work, demanded the building of a new plant adequate to their needs.

Accordingly they erected a new and modern building especially designed for plating, polishing, finishing, lacquer dipping and japanning. Many improvements were made in each department and a number of labor saving machines were installed to place the factory on a quantity, as well as quality, production basis. One of the pieces of new equipment was a Meaker full automatic return type nickel plating unit, made by the Meaker Company, Chicago, Ill.



Loading-Unloading Station of the Full Automatic Return Type Plating Machine

Following is a description of this equipment as given by the Meaker Company.

This Meaker full automatic return type nickel plating unit has a single endless steel conveyor chain running in a horizontal plane. The driving mechanism, endless conveyor, transfer mechanism (that part of the machine that lifts the loaded racks from tank to tank) and cathode electrical connections are supported by a heavy steel frame entirely independent of the tanks. With this construction it has been found that possible misalignment, bulging or swelling of tanks does not disrupt the timing or bind any part of the machine.

The steel roller type conveyor chain is enclosed by a special heavy channel protecting the chain from fumes and moisture and also serving as a guard, to prevent any lubricant from dripping into the cleaning and plating tanks below.

The main conveyor chain advances the rack carrier to a synchronized carrier pin attached to the transfer chain. The carrier is then raised from one tank and gently set down into the next, with the contact shoe resting upon the slide bar making up one leg of the guard channel enclosing the conveyor chain. A pusher pin on the main conveyor chain engages the slide shoe and pro-

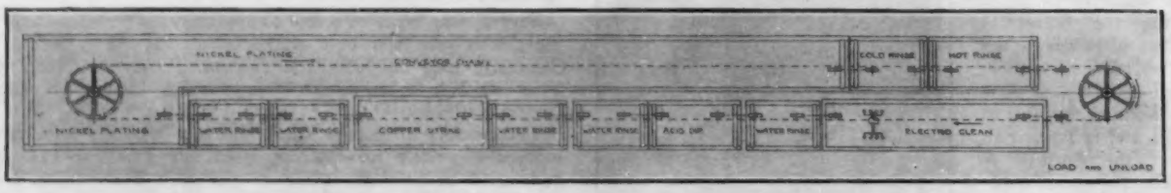


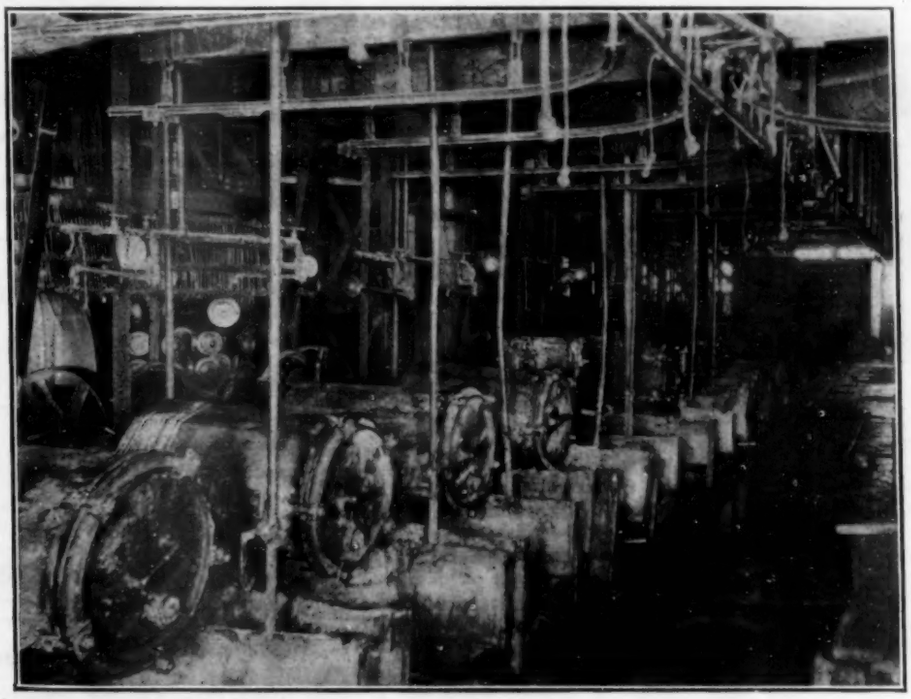
Diagram of the Full Automatic Return Type Nickel Plating Unit

pels it formard to the next transfer position, repeating this motion through the several cleaning, rinsing and plating operations and returning the rack carriers to the one operator where they started.

The tanks are placed in parallel lines with the loading-unloading station at one end. This unit accommodates two average sized racks on each carrier. The rack carrier supports the necessary loads as well as conducts the current required by the racks. The rack carrier obtains its electrical charge from the copper leg

The parts are then immersed for thirty minutes in the nickel plating solution, with current at 10 amperes per square foot of surface of product with tank voltage at 2½. (On this particular job the test of the nickel solution is 20 ounces of single nickel solution, 2 ounces of boric acid and 2 ounces of sodium chloride to each gallon of water.)

The nickel solution is followed by the parts getting a cold and then a hot water rinse.



Battery of Burnishing Barrels in the Plant of the Great Lakes Plating Company

of the guard channel above referred to, which is suspended over the tanks. The collector shoe sliding over and along this bus bar, and the pressure exerted by the weight of the carrier, racks and load insures a good clean electrical contact at all times.

The main tank holds 5,500 gallons of nickel plating solution and there are 1,000 gallons in the copper strike tank. Five to six tons of nickel anode is suspended from the rods representing an investment of from $4,500 to $5,500.

The capacity of this Meaker Automatic Machine varies, of course. It is not a stock item but designed and built in accordance with requirements of each shop. In this case, the machine can handle an assortment of small parts averaging 1″ x 1″ x 2″ at the rate of 10,000 pieces per hour or a total of 85,000 pieces every 8½ hour day.

Larger work averaging around 16″ x 12″ can be run through the machine at the rate of 3,000 to 4,000 pieces per day. Standard phonograph turntables have been handled at the rate of 6,000 pieces per day.

Customers' specifications as to thickness of plating required also have some influence on the capacity of the machine, heavy coatings of metal naturally requiring more time to deposit than light coatings. In a job plating shop, where coating specifications are likely to vary considerably, it is essential that machines be flexible and possess a wide range of speed regulation.

In the work for the Great Lakes Plating Company, two parts are hung upon each rack, making four for each rack carrier. The work is then carried up, over and into the first tank where it is soaked for two minutes in an electro cleaner at 200°-212°F.

In the next tank the parts get a momentary cold water rinse and then are moved over into the muriatic acid dip (composition ½ part commercial muriatic acid and ½ part water) to remove any dirt or scale left from the other cleaning processes.

This step is followed by two cold water rinses and then the rack carriers carry the product into the hot cyanide bath (temperature 125° F.) where the parts are immersed for 1½ minutes. Following the hot cyanide bath are two momentary cold water rinses.

After the last rinse the rack carriers are back at the starting point, parts are removed from the carriers by the one operator who hangs them on an overhead conveyor that takes the work to and through the automatic drying machine, after which the plated and dried housings are discharged at the shipping room.

The chain conveyors are so arranged that when the racks reach the proper point, they are lifted out of the tank and lowered into the next. The timing of the parts in the various solutions and rinses being predetermined and mechanically operated and mechanically controlled, the work is left in solution for the exact time period. On the work under discussion the parts receive .00015″ coating of copper and .00025″ coating of nickel. Predetermined and mechanically operated timing is especially desirable for the plating operations as it assures the right deposit thickness on each type of piece.

It has been estimated that with other non-mechanical equipment to do the same volume of work handled by the Meaker full automatic nickel plating unit in this plant, it would require in some departments three and four times the floor space and from eight to ten men more to do the work, now being done by one man. On many occasions when the work being plated is light in weight, this machine is loaded and unloaded by one girl.

On the main floor of the plating shop, there are various other pieces of equipment besides the Meaker Full Automatic Nickel Plating Machine, including still tanks for nickel, brass, cadmium, electro tin and zinc work. There is also a battery of 28 mechanical plating barrels.

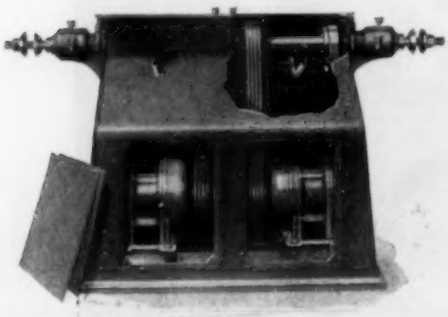
In addition to the full automatic plating machine, there are two Meaker semi-automatic or variable speed machines for cadmium plating. On cadmium plating work they consider it advisable to use these semi-automatic machines because of their large daily capacity, the uniformity of their work, allowing for accurate plating as low as .00008″ of deposit.

These variable speed machines are moving cathode units where the parts are suspended from moving carriers. The material in these machines is constantly in motion and supplied with ample current.

Independent Twin-Spindle Lathe

A new type of polishing machine has been added to the "Reliance" line manufactured by Chas. F. L'Hommedieu and Sons Company, 4521 Ogden Avenue, Chicago, Ill. The new machine, known as the "No. 18 Independent Spindle Motor Lathe," is a twin-spindle polisher in which each spindle operates independently. The makers list the following advantages:

Spindle brake brings spindle to a quick stop, at the same time shutting off the current by operating an auxiliary switch.



New Lathe with Twin Spindles that Are Operated Independently.

Simple to operate and will stand hard usage. Stop lock holds spindle while wheels are being changed. Dust cap protects bearings. Lathe is made with a flat top which provides shelf space. V-belts transmit the full power of the motor to the lathe spindle without vibration. One side of motor frame is hinged, and belt tension is easily adjusted by raising or lowering the other side. Any spindle speed can be obtained by varying the size of the motor sheaves. The same length of belt can be used for any speed. Motors are accessible from both side and rear. Motor is completely enclosed. There is no loss of power from heating, as it is cooled by a fan on the motor shaft.

New Crystal Finish

Zeller Lacquer Manufacturing Company, Inc., 20 East 49th Street, New York City, have announced a new series of lacquer grades for crystalline finishes, under the brand name of "Zelactite." Discussing these materials, Hugo Zeller, president of the company, said:

"In the past, crystalline effects were erroneously called lacquer finishes, and for the most part required heating and baking. The development of air-drying grades of lacquer, eliminating all heating and baking from the user's production work, was considered an economical and practical step, since in addition to other advantages it would provide a single-coat material for crystal effects. Assuming the single-coat grade of this nature a possible achievement, we entered the problem with a full recognition of its difficulties. We weighed all matters of adhesiveness, flexibility, coverage, susceptibility to working conditions, and many other factors. The resulting grades we believe to be reasonably foolproof. At least, the major disqualifications experienced by users of crystalline lacquers have been eliminated in these grades. In the hands of the expert finisher, Zelactite is a practical and economical material."

The practical specifications of "Zelactite" are summed up by the manufacturer as follows:

No baking is required in the application of this material. It is a one-coat finish, lending itself to low production costs for the user, and speed of finishing; has rapid air-drying nature; is applicable directly to metals, woods, compositions, glass surfaces, etc., or almost any reasonably smooth surface which is not too absorptive; supplied ready for use, for spray or dip application.

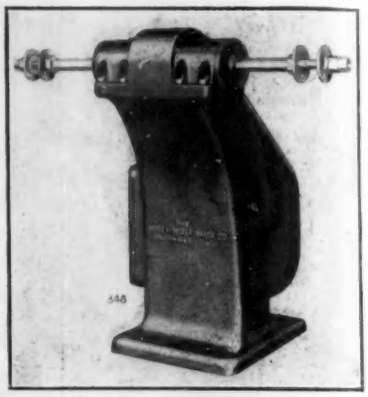
The "Zelactite" grades are of four types: the clear form for use as such; the clear form for use with metallic powders; the translucent form containing colors; and the opaque form containing color pigments. Any color or shade can be provided. In each of the four types mentioned, "Zelactite" is produced in three different sizes of crystals, small, medium and large. Each of these crystal sizes, it is stated, can be increased proportionately according to the heaviness with which the material is applied. Conditions existing during and immediately after application, however, must be taken into consideration.

For the most satisfactory and uniform results, it is desirable that the finish should be allowed to harden in a quiet atmosphere without movement of air currents, and under normal temperatures. Air currents passing over the work and extremes of temperature will have their influence and sometimes impair the finish. All of these conditions of application, however, are easily controllable with an understanding of the facts, even with a minimum of experience.

Extended-Spindle Polisher

Hisey-Wolf Machine Company, Cincinnati, Ohio, announces a new style buffer and polisher having open type spindle extensions, in 3, 5 and 7½ horsepower sizes. The machine is of the "Tex Drive" type and is fully described in the company's Bulletin No. 44, which gives the following advantages for the new machine:

Tobin bronze safety wheel nuts protect flat-top threads; gauged oiling system; drain plug for lubricant flushing; extra-large one-piece spindle; removable pulley hood; ample ball bearings (roller bearings on specification); bearing boxes keyed to column; rigid base, gooseneck design; "Tex-Rope" drive; external type motor mounting with rigid four-point support. Readers of THE METAL INDUSTRY will receive full information on application to the manufacturer.



Open Spindle Extension Buffer and Polisher

Automatic Soldering Apparatus

H. E. Bradley, 709 Washington Avenue, West Haven, Conn., offers the metal trades a line of electrical apparatus for automatic soldering and other purposes requiring application of electricity to industrial processes. The firm states that improved methods of soldering is one of its specialties and manufacturers' requirements are studied with a view to installation of machinery designed to reduce the cost of assembly operations in metal fabricating plants.

Hand Cleaner

A special hand cleaning compound is offered by Quigley Company, Inc., 56 West 45th Street, New York City. The substance is known as "Annite" and is said to dissolve grease and grime effectively, while softening the skin. It is also recommended by the maker for use in general cleaning of utensils, etc. In the metal lines, it is said to be highly useful to enamelers, spray operators, polishers, foundrymen, wire makers, machinists, etc. The action of "Annite" is stated to be non-chemical, only emulsification of oils and greases being employed to liberate dirt.

Reclaimed Metals and Alloys

Industrial Metal Company, 85 Hvatt Avenue, Newark, New Jersey, offer a line of reclaimed nickel, nickel alloys and metal specialties. The company produces cast bells and cymbals, gears and other bronze products, foil of various metals, wire cloth, propellers, tin and tin alloy residues, etc. Alloys of practically all non-ferrous base and precious metals are also manufactured. The company purchases metal- or mineral-bearing materials of all descriptions.

Pan Electric Manufacturing Company

Pan Electric Manufacturing Company, St. Louis, Mo., manufacturers of electric motors, generators and other electrical equipment, plan expansion of manufacturing facilities as well as stocks of equipment for shipment on orders. The company recently declared a 500% stock dividend, and the directors at the same time voted to increase the $30,000 capitalization to $250,000, which was unanimously approved by stockholders, the latter having preference in stock subscriptions. The stockholders subscribed for the full amount of the issue and a new charter from the state of Missouri is being obtained. Under the former broad charter, the company organized to manufacture and repair electrical and mechanical appliances, then gradually narrowed the scope of its activities and is now mainly a manufacturer.

Quality products are made, the company states, pointing out that a 1,000 ampere, 6 volt, 900 r.p.m. generator sold to the St. Louis Trunk Hardware Company in 1905 was sold by the latter firm in 1914 to the Bussman Fuse Company, who still operate the machine in regular production, with long periods of 24-hour per day operation, delivering not its rated 6 volts but 7½ volts at 660 r.p.m., with full load. The original commutator has lasted through the whole of this 26 years and is still in use; it was designed by F. I. Chandeysson. The company has built thousands of machines since 1904, while also redesigning and rebuilding equipment, and buying and selling used equipment which is marketed under guarantees protecting purchasers, the company states.

Heretofore, from 1,500 to 2,500 motors, generators and motor-generator sets have been carried in stock for immediate delivery. The new capital will provide facilities for enlarging this ready stock, as well as for expanded manufacturing operations.

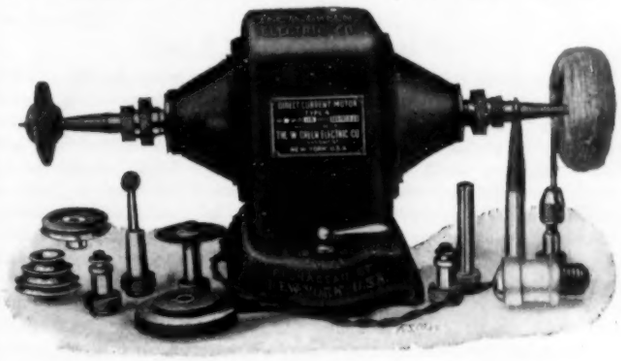
Satin Finished Sheet Metal

American Nickeloid Company, Peru, Ill., have placed on the market "Satin Chromaloid," a satin-finished sheet metal for manufacturing purposes such as in kitchenware, store fixtures, moulding, etc. The new product is described as a high grade chrome-nickel-zinc sheet metal. It is claimed that it will not tarnish or show easily the effects of scratching or abrasion sustained in ordinary handling in course of fabrication. Good wearing qualities are stressed, as well as ease of cleaning and working. Samples and complete details may be had by readers who will address the company either at the general offices, Peru, Ill., or at 50 Church Street, New York City.

Small Combination Lathes

A line of small combination lathes suitable for jewelry and kindred work, made in sizes from ⅛ up to 2½ horsepower, are offered by W. Green Electric Company, 182 Broadway, New York, manufacturers of equipment for plating, polishing and finishing.

These machines are stated by the manufacturer to be useful for polishing, buffing, drilling, grinding, turning and sawing. The



Combination Lathe for Small Work

lathes are equipped with patented interlocking "bayonet" steel chucks by means of which change-overs from one operation to another are made rapidly. It is stated that when in position the chuck arrangement becomes as firm as a solid shaft.

The motors are specially designed for these machines. They are variable speed, adjustable, self-starting, noiseless, enclosed and and the entire machine is portable. Air, dust and water is prevented from entering the motor by special design features, the maker states.

Equipment and Supply Catalogs

Norton 44" Car Wheel Grinding Machine. Norton Company, Worcester, Mass. Illustrated bulletin.

Industrial Ovens. Fred Hover Company, 1235 West Lake Street, Chicago, Ill. Illustrated loose-leaf folder on ovens and other heating equipment.

P. B. Sillimanite Ramming Mixture for Monolithic Furnace Construction and Repair. The Charles Taylor Sons Company, Cincinnati, Ohio. Booklet, illustrated.

Chemical Engineering. University of Michigan, Ann Arbor, Mich. Bulletin of courses, with graduate programs in general chemical, metallurgical, gas and organic chemical engineering.

Metropolitan Life Insurance Company, New York. Publications of the Policyholders' Service Bureau: Financial Statements in Annual Reports to Stockholders; Employee Magazines.

World's Largest Graphite Crucibles Made in Trenton. Bartley Crucible and Refractories Company, Trenton, N. J. Reprint of an article from "Trenton Magazine," for November, 1930.

The Oasis. The Egyptian Lacquer Manufacturing Company, Inc., 90 West Street, New York. First issue of a house organ, to be issued monthly, ten times a year, and which may be had upon application to the company. Contains interesting information on lacquers, lacquer-enamels, etc.

Review of the Silver Market for 1930. Handy and Harmon, 57 William Street, New York. A thorough analysis of the world situation in silver, prepared by the leading precious metal seller. This is one of the most authoritative reviews available on this subject.

Industrial Electric Heating Equipment. Westinghouse Electric and Manufacturing Company, Industrial Heating Division, Mansfield, Ohio. Catalog 247; 100 pages; fully illustrated. Covers a large variety of equipment, including furnaces, melting pots, metal holders, instruments, elements for many purposes, ovens, etc.

General Electric Company, Schenectady, N. Y., publications: GEA-925B on Oil Circuit Breakers; Mechanical-Drive Turbines; Steam Turbines; Photoelectric Relay for Actuating Operations by a Beam of Light; Phase Protective Panels; Fractional-Horsepower Motors; General-Purpose Squirrel-Cage Induction Motors Type KF.

The Season's Greetings

THE METAL INDUSTRY wishes to express appreciation to all those who so thoughtfully sent holiday greetings, calendars, souvenirs, etc.:

The American Brass Company, Waterbury, Conn.
Joseph Dixon Crucible Company, Jersey City, N. J.
The Dust Recovering and Conveying Company, Cleveland, Ohio.
General Electric Company, Schenectady, N. Y.
Mack Printing Company, Easton, Pa.
National Lead Company, New York; **William A. Cowan,** Research Laboratories.
Roller-Smith Company, New York.
West Virginia Pulp and Paper Company, New York.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

American Foundrymen's Association

HEADQUARTERS, 222 WEST ADAMS ST., CHICAGO, ILL.

Review of 1930 Activities

During 1930, substantial progress has been made by the numerous committees of the American Foundrymen's Association toward solution of some of the major problems of the foundry industry. Among the problems which have been vigorously approached, and are now being dealt with are the following: Liquid shrinkage of nonferrous and ferrous metals; recommended practices for various nonferrous alloys; revision of methods of testing and grading foundry sands; cooperation with engineering schools in furthering foundry education; development of foundry standards; and approval of standard colors for patterns and core boxes.

The scope of the Nonferrous Division has been broadened and the work of the various committees made more effective through appointment of an Advisory Committee as a directional body. John W. Bolton, The Lunkenheimer Company, Cincinnati, Ohio, has been appointed chairman of this advisory group, with Sam Tour, of Lucius Pitkin, Inc., New York, as vice-chairman.

More interest has been displayed in foundry cost work, and the committee on nonferrous foundry costs has accomplished beneficial results since 1929. One of the most interesting sessions at the 1930 A. F. A. convention was that which dealt with this particular subject.

Approval was recently given by the directors to the 1931 edition of the official sand test book published by the Association. This, the third edition of this important publication, will be printed early in the coming year and will contain the latest data on methods of testing and grading foundry sands.

The Nonferrous Committee also has developed recommended practices for the various standard nonferrous alloys. These practices bring out the physical properties which it is possible to obtain with various alloy mixtures and describe the best foundry practice for melting and casting.

Another important project under way during the past year is the research on liquid shrinkage of cast metals. A method for measuring shrinkage has already been worked out through a research assistant at the Bureau of Standards, and when completed, the data obtained should be of inestimable value.

One of the most important and interesting activities of the American Foundrymen's Association is, of course, the annual convention. The 1930 convention in Cleveland proved exceptionally successful, attendance figures breaking all previous records. More exhibit space for foundry equipment, machine and supply firms also was occupied, displaying the latest improvements in labor, time and cost-saving materials for the foundry.

Plans now are going forward for the 1931 convention, which will be held at the Hotel Stevens, Chicago, Ill., the week of May 4th. A full program of papers and reports are being scheduled for this event, in addition to an exhibition of foundry equipment and supplies.

Beginning in January, 1930, the A. F. A. commenced publication of a monthly magazine, "Transactions and Bulletin," in which are printed not only all the convention papers and their discussion, but also progress reports on all committee activities and worthwhile papers on foundry problems presented at various district foundry association meetings. The new publication makes available to the industry all the convention transactions and papers immediately after the convention. Formerly this material was not available until publication of the bound volume of "Transactions" at the end of the year.

During the past year the policy of exchanging technical papers between the A.F.A. and foreign foundry associations was continued and extended. Exchange papers were contributed to the French, Belgian, British and Australian foundry associations, the latter exchange being initiated in 1930.

In spite of adverse business conditions, the foundry industry is not going backward. Instead, it is realizing more than ever before the necessity for plant efficiency. It is becoming increasingly conscious of the importance of knowing its costs and of keeping those costs down to a minimum. Some plants also are utilizing unused plant capacities for performing various researches the final results of which should add considerable to the knowledge of foundry practice.

More important than almost any other activity, however, is the growing realization that in a highly competitive market such as exists today, castings of superior quality will bring a premium. Therefore, the main activity of the American Foundrymen's Association during the year 1931 will be, as it must be, in the direction of improving the quality rather than increasing the production of sand castings and sand-cast products.

American Electroplaters' Society

Baltimore-Washington Branch

HEADQUARTERS, CARE OF I. H. HAHN, 207 SOUTH SHARP STREET, BALTIMORE, MARYLAND

Annual Banquet, January 31

The annual educational session and banquet of the Baltimore-Washington Branch will take place on the afternoon and evening of Saturday, January 31, 1931, at the Hotel Emerson, Baltimore, Md. The session will begin at 2:30 P. M., and the banquet at 7:00 P. M. All A. E. S. members and their friends are urged to attend. Reservations for the banquet should be made as early as possible. Address headquarters above.

The program for the educational session includes:

Studies in Metal Polishing (illustrated with slides), by E. M. Baker, University of Michigan.

Problems in Job Plating, by R. J. O'Connor, Contract Plating Company, Bridgeport, Conn.

Summary of Chicago Research Conference, by Dr. W. Blum, Bureau of Standards, Washington, D. C.

Recent Progress in Science, by H. D. Hubbard.

Philadelphia Branch

HEADQUARTERS, CARE OF J. E. UNDERWOOD, 327 NORTH TENTH STREET, CAMDEN, N. J.

Philip Uhl Testimonial Dinner

The Philadelphia Branch held a testimonial dinner in honor of Philip Uhl, past secretary of the Branch, January 9. The dinner was followed by the first 1931 meeting of the Branch. A very good time was enjoyed by all those present.

St. Louis Branch

HEADQUARTERS, CARE OF C. T. McGINLEY, 8214 FAIRHAM AVENUE, ST. LOUIS, MISSOURI

Annual Banquet and Session

The annual banquet and educational session of the St. Louis Branch of the American Electroplaters' Society will take place on January 24, 1931, at the Hotel Chase, St. Louis. The educational session will begin at 2:45 p. m., and the banquet at 6:30 p. m. Dr. L. E. Stout of Washington University will direct the session and will demonstrate new methods of chemical control, analysis, etc. Anyone interested is urged to attend.

Institute of Metals Division

HEADQUARTERS, CARE OF W. M. CORSE, 810 EIGHTEENTH ST., N. W., WASHINGTON, D. C.

The Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers held a very successful joint meeting with the American Society for Steel Treating in Chicago last September. The officers and members of both groups were so well satisfied that they will follow the plan of holding joint sessions next autumn also.

There is an increasing interest in technical publications of the Division, as is shown by the fact that 1,418 members are now receiving them as against 1,255 a year ago.

The high quality of the "Transactions" has created much favorable comment, and the Division is pleased to acknowledge its debt to Mr. Sam Tour, Chairman of the Papers and Publications Committee, in this connection.

The Annual Lecture for 1929-1930 was financed out of investments, and the same plan will be pursued in 1931.

A Division member and Past Chairman, namely Mr. W. H. Bassett of the American Brass Company, is now the President of the American Institute of Mining and Metallurgical Engineers.

W. M. CORSE, Secretary-Treasurer.

National Founders Association

HEADQUARTERS, 29 SOUTH LA SALLE STREET, CHICAGO, ILL.

Review of 1930

In spite of the business depression of 1930, from which the foundry industry suffered its full share, the National Founders Association had a successful year. Its finances are such that an amendment to the By-Laws, providing for a reduction of assessment rates, is now being voted on by the membership. The various bureaus—Safety, Foundry Service, Personnel Relations—reported a fairly busy year, many members taking advantage of the dull period to study their problems and develop more efficient methods in preparation for a turn in business. Labor troubles in the shops of its members were practically negligible.

In 1931, the Association plans a more aggressive campaign for its Educational Department. Regional meetings are to be held in all the prominent foundry centers for the discussion and practical demonstration of the principles of good work and of effective supervision. The aim of the Association is to instill in the minds of the management and supervisors a personal interest in their employes, and in the minds of the employes the same personal interest in their work, their foreman and superintendent, their manager and company.

J. M. TAYLOR, Secretary.

Western Metal Congress

The National Western Metal and Machinery Exposition and National Western Metal Congress will be held in San Francisco, Calif., February 16-20, 1931, at the Civic Auditorium. During the congress, William Halzhauer, of the Aluminum Company of America, will read a paper on aluminum alloys for frames and steering rods, and on other engineering methods of making machines lighter.

J. M. Watson, chief metallurgist, Hupp Motor Car Company, will read a paper on light weight automotive steels.

P. G. McVetty, Westinghouse Electric and Manufacturing Company, who has spent years in developing statistics on just how much creeping results at various temperatures in metals and alloys, will read a paper showing what alloys have been developed to combat this creeping.

W. N. Dunlap, Aluminum Company of America, will read a paper on welding aluminum and its alloys.

M. C. Smith of Stoody Company, Los Angeles, will read a paper on welding of alloy overlays.

G. F. Scherer, Merco-Nordstrom Valve Company, will read a paper on corrosion and lubrication of valves.

C. B. Phillips, Surface Combustion Company, Toledo, Ohio, will read a paper on modern heat treating.

A. H. d'Arcanbal, Pratt and Whitney Company, will present a paper on the machinibility of metals.

The National Western Metal and Machinery Exposition will be the second great industrial show held in the west.—G. W. G.

The Electrochemical Society

HEADQUARTERS, COLUMBIA UNIVERSITY, NEW YORK CITY

1930 and 1931

During 1930, The Electrochemical Society held two meetings, one in the Spring in St. Louis and the other in Detroit in the Fall. At the St. Louis meeting, particular attention was devoted to hydro-electrometallurgy, T. H. Donahue presiding at the session. Marked progress has been made in the electrometallurgy of copper, zinc, bismuth, lead and nickel, and the St. Louis volume of the Transactions is most valuable on account of the up-to-date information on these metals from various experts of the world. Besides the hydro-electrometallurgical papers, there were twenty other papers communicated, covering electrodeposition, electroplating, electric furnace, corrosion, batteries, etc. The Round Table Discussion at St. Louis was conducted by Prof. Alexander Langsdorf of Washington University. A long debate on "Water Power vs. Fuel-Generated Power for Electrochemical Industries" took place, and the opinion of many of the engineers present was that fuel power is now very often a serious competitor of hydro-electric power.

The Fall meeting was held at Detroit. The main session was devoted to corrosion; Dr. F. N. Speller presided. Particularly noteworthy were the papers presented by the Bell Telephone Laboratories and the General Motors Laboratories. At the session on theoretical electrochemistry, with Dr. Kahlenberg presiding, the paper that stimulated animated discussion was his own in conjunction with A. C. Krueger, on "Gas Electrodes." The Round Table Discussion was on high test gray iron, presided over by Dr. Richard Moldenke, whose recent death is mourned by all his friends and colleagues.

For 1931, two meetings are planned, the Spring Meeting at Birmingham, at which Prof. Stewart J. Lloyd will be in charge of the local committee. The main session will be devoted to "Electrochemistry and Ceramics." Other sessions will be devoted to "Electronics" and the "Electrodeposition of the Rarer Metals."

The Fall meeting will be held at Salt Lake City the first week of September. Many of the members are planning a vacation to Yellowstone Park previous to attending the convention at Salt Lake. Three main topics will be brought up for discussion: "The Physical Chemistry of Flotation," Prof. A. M. Gaudin presiding; "Cyanides in Metallurgy," with M. R. Thompson, Bureau of Standards, as chairman; Round Table Discussion on "Silver," Prof. J. A. Fulton presiding.

COLIN G. FINK, Secretary.

Waste Material Dealers' Association

HEADQUARTERS, TIMES BUILDING, NEW YORK CITY

Trade associations generally have found the past year not only one that has tried the souls of those responsible for their success or failure, but a year which has furnished an acid test as to whether a given organization has a right to exist. The National Association of Waste Material Dealers, Inc., feels that it has met this test successfully and is coming through with flying colors.

The Metal Division is one of the strongest of the groups that make up the organization. Its standard classification for scrap metals is known and used all over the world.

The National Association of Waste Material Dealers, Inc., is making plans for 1931 in full confidence that the country will shortly return to satisfactory and prosperous business conditions.

CHARLES M. HASKINS, Secretary.

Personals

J. E. Hart

The Walworth Company, Boston, Mass., announced recently the promotion of J. E. Hart to the position of Works Manager of its Boston works. Mr. Hart had been general superintendent.

J. E. Hart has had a long and varied career in the pipe and fittings industry. In 1902 he came from Wisconsin to Kewanee, Ill., to take a position as clerk in the pipe finishing department of the Western Tube Company. When the company three years later bought the Scott Well Point Company, Chicago, Ill., Mr. Hart was given charge of well point production. In 1907 the nipple and radiator departments came under his supervision, and the acquisition of the Kewanee company by Walworth in 1917 brought Mr. Hart to the latter firm. He took over the rating department in 1920, then became assistant supervisor of planning work. In 1923 Mr. Hart went to Boston, where he undertook to solve a number of pressing problems at the Walworth Boston Works. His success there resulted in promotion to General Superintendent. The seven strenuous years during which he worked in that position are said by "Walworth Boston Craftsman," the company's publication, to have been frought with problems involving changes, innovations, new demands for service and quality, and serious business competition. Mr. Hart proved equal to all exigencies.

J. E. Hart

George B. Hogaboom of the Hanson-Van Winkle-Munning Company and an associate editor of THE METAL INDUSTRY, give a talk before the Newark Branch of the American Electroplaters' Society on Friday night, December 5, 1930, at Franklin Hall, Newark, N. J. Mr. Hogaboom gave abstracts of papers by William Phillips, Dr. H. C. Mougey and J. C. Wirshing of the General Motors Research Laboratories on "High Acid Nickel Solutions, Heat Treated Chromium Deposits, and Calcium Chloride versus Sodium Chloride for Salt Spray Tests." Samples were exhibited of pieces processed at the General Motors Research Laboratories and grateful acknowledgment is given to those laboratories for their courtesy.

Rod G. Cooper has been appointed to take charge of the new Cincinnati, Ohio, district sales office of the Bridgeport Brass Company, Bridgeport, Conn. The office is at 537 Dixie Terminal Building. Mr. Cooper was with Western Cartridge Company for two years as sales representative in the same territory. For the past five months he has been ill, but is now well again. He states the Cincinnati office will serve the area as far southwest as St. Louis, and south to New Orleans, La. He reports he has booked considerable orders on copper and brass sheet, rod and pipe already.

Walter F. Graham has been appointed technical director of the Caskey Brass and Bronze Works, Inc., Philadelphia, Pa., agents of the International Nickel Company and specialists in the production of nickel, nickel alloy and special non-ferrous castings. Mr. Graham has written a number of papers on foundry practice, and was in charge of the technical division of the Ohio Brass Company. Some years ago he developed and patented "Everbrite" metal, a nickel-copper alloy, and in this connection served as chief metallurgist of the American Mond Nickel Company.

Herbert J. Winn, president of the Taylor Instrument Companies, Rochester, N. Y., and **DeForest Hurlbrud,** president of the Elgin National Watch Company, Elgin, Ill., were two of the many industrial leaders who signed a large declaration in which was expressed marked confidence in the increase of prosperity in 1931, saying in part: "The signers of this document believe that the depression has spent itself, good times are on the way, 1931 will see marked recovery . . . "

Harold E. Webster, vice-president of Pratt and Lambert, Inc., Buffalo, N. Y., manufacturers of various types of metal products, has been elected president of that corporation to succeed the late A. D. Graves, who died November 21, 1930. Mr. Webster has been with the Buffalo company since 1908 when he was graduated from Yale.

Obituaries

James C. McGuire

The death on December 7, 1930, of James C. McQuire ended the life of an aluminum pioneer.

Thirty-five years ago, Mr. McGuire was a contemporary of Alfred E. Hunt, Charles M. Hall and Arthur V. Davis, also aluminum pioneers. In the nineties Mr. McGuire had charge of the New York office of the then Pittsburgh Reduction Company, now the Aluminum Company of America, and he was an able speaker and writer on aluminum subjects.

His metallurgical writings were published in the "Aluminum World," a paper started by Frederic F. Burgin on the instance of Alfred E. Hunt, to popularize and extend the knowledge of aluminum. Among the notable articles written by Mr. McGuire in the early days of aluminum were the following: "Aluminum for the Yacht Defender"; "Aluminum: Its Alloys and Their Use in Ship Construction"; "Recent Developments in the Use of Aluminum in the Arts and Manufactures"; "The Use of Aluminum in Warfare by the Armies and Navies of the World"; "The Advantages to Be Derived in Building the New Cup Defender of Aluminum."

At the time of his death, Mr. McGuire was a consulting engineer and contractor, and president of the Knickerbocker Hospital. In his will he left five pieces of china which once belonged to James Madison, and a silver tray which had belonged to George Washington, to the White House for permanent exhibition. To the Smithsonian Institute he left a fragment of the original rudder of the American frigate "Constitution."

William S. Ingraham

William S. Ingraham, for nearly 40 years treasurer and general manager of the E. Ingraham Company, Waterbury, Conn., clock manufacturers, died at his home in Bristol, Conn., on December 15, 1930, after an illness of several weeks. He was 73 years of age.

Mr. Ingraham, a native of Bristol, left Cornell University, where he was a member of the class of 1878, to engage in the clock business with his grandfather, Elias Ingraham, and his father, Edward, over fifty years ago. Elias Ingraham was founder of the company.

Besides being treasurer and general manager of the clock company for 38 years, William S. Ingraham was identified as an official with numerous financing, industrial and public institutions in Bristol.

W. R. B.

Thomas A. Mackenzie

Thomas A. Mackenzie, son of Duncan Mackenzie, founder of the Mackenzie Foundry, and himself prominently identified with the Mackenzie enterprises for many years, died at his home, 1404 Greenwood Avenue, Trenton, N. J., recently. He was 62 years old. Mr. Mackenzie was born in Trenton and educated in the Trenton public schools. He was associated with his father in business and upon the death of his brothers assumed the management of the family's interests, among which were the Trenton Steel and Wire Company and the Union Company. Eight years ago he had retired from business. C. A. L.

Stanley Doggett

Stanley Doggett, president of Stanley Doggett, Inc., 99 John Street, New York City, makers of paint, chemicals, foundry supplies, etc., died December 29, 1930. Mr. Doggett, who was 60 years old, slipped and fell on the steps of a railroad station at East Orange, New Jersey, where he lived. Striking his throat against a step, he injured his gullet. Press reports stated that this brought on a heart attack from which he did not recover.

William F. Hess

William F. Hess, general manager of the National Aluminum Company, Cleveland, Ohio, died suddenly on October 30, 1930, at Akron, Ohio, where he had gone on business. Mr. Hess was 39 years of age, and a well-known man in the manufacturing industries at Cleveland.

Richard P. Joy

Richard P. Joy, a former vice-president of the Detroit Copper and Brass Rolling Mills, died at Detroit, December 15, 1930.

Anker S. Lyhne

Anker S. Lyhne, president of the Bridgeport Metal Goods Company, Bridgeport, Conn., died on November 28, 1930. Mr. Lyhne was 65 years of age. In 1891 he joined Sargent and Company, New Haven, Conn. He went to the New Britain Hardware Manufacturing Company in 1901. Later he became assistant superintendent for the Bridgeport Brass Company. He organized the Bridgeport Metal Goods Company in 1909.

Michael A. Norton

Michael A. Norton, president of the Albany Brass Foundry, Inc., Albany, N. Y., died recently. Mr. Norton was formerly president of the Sweet and Doyle Foundry Company, Green Island, N. Y.

George S. Flanders

George S. Flanders, for 32 years superintendent of the American Tube Works, Somerville, Mass., died on December 16, 1930, at the age of 86. Mr. Flanders retired about 10 years ago.

James T. Whitehead

James T. Whitehead, structural steel manufacturer and identified with the non-ferrous metal trade, died in Detroit, Mich., last month, after an illness of several weeks.

Harry W. Workman

Harry W. Workman, president and manager of the Lima Metals Foundry, Lima, Ohio, died on December 2, 1930.

Necrology—1930

Among those of prominence in the metal industries who passed away in 1930 were the following:

Wilfred Lewis, ex-president, Tabor Manufacturing Company, Philadelphia, Pa.

W. E. Gerlinger, president, Gerlinger Brass and Aluminum Company, West Allis, Wis.

Warren P. King, vice-president, Aluminum Company of America, Cleveland, Ohio.

Ralph Herbert Smith, president, Smith and Griggs Manufacturing Company, and president Waterbury Button Company, Waterbury, Conn.

William J. McConnell, consulting manager, plating division Singer Manufacturing Company, Elizabeth, N. J.

Edward J. Lavino, chairman, board of directors, E. J. Lavino and Company, Philadelphia, Pa.

Elwin R. Hyde, president, Bridgeport Safety Emery Wheel Company, Bridgeport, Conn.

Francis D. Wanning, vice-president, Farrel-Birmingham Company, Ansonia, Conn.

William M. Rule, Michigan Copper and Brass Company, Detroit, Mich.

George H. Benham, ex-treasurer, Holmes, Booth and Hayden Manufacturing Company, Waterbury, Conn.

Augustus H. Bullard, secretary-treasurer, Bullard Manufacturing Company, Waterbury, Conn.

William G. Wherry, president, Skillman Hardware Manufacturing Company, Trenton, N. J.

George P. Gerlinger, president, Gerlinger Brass and Aluminum Foundry, Milwaukee, Wis.

Rudolph Seldner, treasurer, Seldner and Enequist, Inc., Brooklyn, N. Y.

John H. Hurlbut, treasurer, Plume and Atwood Manufacturing Company, Waterbury, Conn.

John P. Durfee, vice-president, Waterbury Brass Goods Corporation, Waterbury, Conn.

Charles E. Young, vice-president, Imperial Brass Manufacturing Company, Chicago, Ill.

E. J. Woodison, president, E. J. Woodison Company, Detroit, Mich.

William H. Bristol, president, Bristol Company, Waterbury, Conn.

William E. Fulton, ex-president, Farrell Foundry and Machine Company, Waterbury, Conn.

Elmer A. Sperry, president, Sperry Gyroscope Company, Brooklyn, N. Y.

Roswell A. Moore, secretary-treasurer, Waterbury Buckle Company, Waterbury, Conn.

William S. Ingraham, treasurer and general manager, E. Ingraham Company, Waterbury, Conn.

William H. Kelly, inventor of "Kelly" metal, Los Angeles, Calif.

Charles E. Westcott, Snow and Westcott, Providence, R. I.

Waldo C. Bryant, president, Bryant Electric Company, Bridgeport, Conn.

W. W. Patrick, director, Foxboro Company, Foxboro, Mass.

Frank L. Driver, Sr., chairman, Driver-Harris Company, Harrison, N. J.

Carl Ricard, Ricard and Freiwald, London, England.

Colonel Robert M. Thompson, ex-chairman, International Nickel Company, New York.

Daniel Guggenheim, Guggenheim Brothers, New York.

Dr. Herbert H. Dow, president, Dow Chemical Company, Midland, Mich.

Pierce D. Schenck, president, Duriron Co., Dayton, Ohio.

Dr. Richard Moldenke, metallurgist, Watchung, N. J.

Charles Filkins, vice-president, Bell Foundry Company, Northville, Mich.

Reginald P. Tracy, president, Manning Bowman and Company, Meriden, Conn.

William F. Hess, general manager, National Aluminum Company, Cleveland, Ohio.

Stanley Doggett, president, Stanley Doggett, Inc., New York.

Michael A. Norton, president, Albany Brass Foundry, Albany, N. Y.

Richard P. Joy, former vice-president, Detroit Copper and Brass Rolling Mills, Detroit, Mich.

Anker S. Lyhne, president, Bridgeport Metal Goods Company, Bridgeport, Conn.

News of the Industry

Industrial and Financial Events

New Lacquer Plant at Philadelphia

The Gilbert Spruance Company announces the completion of a new lacquer plant at Richmond and Tioga Streets, Philadelphia, Pa. It will be devoted exclusively to the manufacture of lacquers, lacquer enamels and spirit finishing products and is under the

Interior View in New Lacquer Plant

supervision of A. R. Chapman, assisted by a staff technically and practically qualified for the manufacture of these products. The new plant puts the company among the foremost lacquer manufacturers. Production capacity is now many times as great as formerly.

The company is following a policy of sales expansion of considerable magnitude. Industrial and trade sales organizations are being enlarged by additional representation. The industrial sales division is now in complete charge of N. E. Dabolt, chemical engineer, who has had wide experience in the manufacture and sale of lacquer and is well known in that field. Mr. Dabolt is a graduate of Syracuse University. For four years he was connected with the General Electric Company, Pittsfield, Mass., as chemical engineer. There followed a period of three years during which he was metropolitan representative of the Zapon Company, and, after occupying the position of New England manager for the same company, he was appointed general sales manager, which position he held with marked success for a period of over seven years. Then, for a time, he left the lacquer field entirely. Now he has returned to take charge of Spruance sales.

N. E. Dabolt

With the increased facilities and the program of sales expansion, the company has adopted a definite merchandising and advertising policy; a program for 1931 has been prepared and will be consistently carried through, it is stated.

Quaker Chemical Products Corporation

The Quaker Chemical Products Corporation, Conshohocken, Pa., has been organized under the Laws of Pennsylvania. The officers of the new company are, D. J. Benoliel, president; E. Niessen, vice-president; L. O. Benoliel, treasurer; S. L. Krauss, secretary.

These men have been identified with the metal industries for many years. D. J. Benoliel was formerly sales manager of the International Chemical Company, Philadelphia; E. Niessen is president of the Quaker Oil Products Company, Conshohocken, and was formerly sales manager of E. F. Houghton, Philadelphia; and L. O. Benoliel was assistant to the general manager of the International Chemical Company. This new company has, in effect, taken over that part of the Quaker Oil Corporation business that caters to the metal, transportation and allied industries. The new organization is ready to serve the metal industry in the solution of any mechani-chemical problem, it is stated.

Brass Ingot Statistics

Non-Ferrous Ingot Metal Institute, Chicago, Ill., reports the average prices per pound received by its membership on commercial grades of six principal mixtures of ingot brass during the twenty-eight day period ending January 2, 1931, as follows:

Commercial 80-10-10 (1% impurities)	11.157c
Commercial 78% metal	9.522c
Commercial 81% metal	10.008c
Commercial 83% metal	10.246c
Commercial 85-5-5-5	10.214c
Commercial No. 1 yellow brass ingot	7.999c

Metals for Buildings

William H. Jackson Company, Brooklyn, N. Y., has been awarded a large contract for interior ornamental bronze to be used in the new Waldorf-Astoria Hotel, now under construction in New York City. This includes bronze store fronts and grilles for the arcade, showcases and other interior work. A special nickel finish to be known as "Waldorf bronze," will be applied to the work, which is said to be of extremely fine design, making the contract one of the most important ever placed for such material.

General Bronze Corporation, New York, was awarded the contract for all exterior bronze some time ago, and it is now in process. It includes immense doorways, tower lanterns, and other work.

Increasing use of white metals for decorative and ornamental purposes which has been developed by modernistic designs in architecture is reflected in the new store of the T. Eaton Company, Limited, which has just been completed in Toronto, Canada. More than a quarter of a million pounds of Monel metal was specified by the architects for this tremendous commercial development that overshadows everything else of a similar nature within the British Empire. Practically every bit of metal work in the interior of the store has been executed in this nickel alloy.

Foundry Booked Full to August

The John Harsch Bronze and Foundry Company, Cleveland, Ohio, specializing in architectural work for banks, public and office buildings, is booked to capacity up to August next year, according to the "American Metal Market," New York. The fabricating department is working seven days a week and will continue to do so for balance of year. The company is rushing deliveries of architectural iron, aluminum and bronze work for Severance Music Hall, Cleveland, and working on ornamental iron, aluminum and bronze for the 28-story bank building for the Central Depositors Bank in Akron, Ohio. A contract has been booked for the aluminum and monel metal work for the Pittsburgh Federal Reserve Bank.

Decorative Metalwork Exhibited

An excellent exhibition of decorative metal work was held at the Metropolitan Museum of Art, New York City, last month, by the American Federation of Arts, which sponsored the third annual exhibition of contemporary industrial art, which included textiles as well as metals. The metalwork shown indicated, according to critics, a continued desire on the part of designers to embody true beauty in direct kinship to the function of the object. Ornamentation having no relation to the purpose of the object apparently is being avoided. The exhibition included many finely executed metal pieces such as tableware in a variety of metals, grilles, silverware, pewter, and iron and bronze work in various finishes. The exhibits are to be shown in Chicago and Cleveland.

Metals and Plating in New Device

C. E. Pease Company, Chicago, Ill., manufacturers of blueprinting machinery, announce a new machine known as the "Junior" sheet dryer for blue-prints, negatives, photo prints, and other types of sheets, making special mention of the use of chromium plate and certain metals which, they state, give the machine features of superiority. A chromium plated copper cylinder is used for heating and drying the sheets. Many parts are of brass, and the iron frame is given an enamel finish.

Tiffany's Produce Cup for Lipton

The much-publicized "loser's" cup which was given to Sir Thomas Lipton, "world's gamest loser," was produced by Tiffany and Company, New York. The cup was distinctive for its excellent design and execution, with gold body and base made of silver donated by residents of Utah, where it was mined. The cup is eighteen inches tall.

Power Show

The ninth national Exposition of Power and Mechanical Engineering was held at Grand Central Palace, New York, the week of December 1, 1930. The exhibits were numerous and demonstrated the most modern methods and equipment for producing and applying power. Metals and finishes of many kinds were displayed in connection with the machines and devices shown.

Lincoln Prize Competition

The importance and far-reaching effects of the Second Lincoln Arc Welding Prize Competition recently announced by The Lincoln Electric Company, Cleveland, Ohio, was demonstrated recently in a survey of inquiries made to the sponsoring company for further details on the competition, the company announces. Of particular significance in this survey of inquiries, which are said to number well into four figures, is the variety of industries covered, and the interest shown in foreign countries. The requests for further information cover practically every known industry, and are distributed over a wide range of industrial positions. The competition, announced approximately six weeks ago, to stimulate new applications of arc welding, carries 41 prizes totalling $17,500. The contest closes October 1, 1931, and is open to anyone in the world except employees of the sponsoring company.

Simplified Practice in Flatware

The Bureau of Standards, United States Department of Commerce, Washington, D. C., announces that the Standing Committee has reaffirmed without change for a period of one year the Simplified Practice Recommendation No. 54, on Sterling Silver Flatware. About 99% adherence to the recommendation was indicated by a survey made prior to the revision in December, 1930.

Incorporations

L. J. Bordo Company, Philadelphia, Pa., organized with $50,000 capital, will take over the company of the same name manufacturing valves, swing joints, gages, regulators and other engineering specialties, and will expand production. New plant at Glenside, Pa., has been acquired, and the company has removed its headquarters to that city as of January 1. The company is headed by **L. J. Bordo, H. N. Christmas** and **C. M. Kennedy.**

Business Reports of The Metal Industry Correspondents

New England States

Connecticut Industry in 1930

The beginning of the past year saw the acquisition of the Schrader's Sons plant in Brooklyn, N. Y., by the Scovill Manufacturing Company of Waterbury at a price said to be in the vicinity of $21,000,000. The Stanley Works of New Britain increased its capital stock from $10,000,000 to $13,000,000 by the issuance of a 25 per cent stock dividend. MacDermid, Inc., of Waterbury bought the Carroll Wire plant in February and moved into it. Ralph H. Smith, president and treasurer of Smith and Griggs and of the Waterbury Button Company, died February 12. In February, W. T. Hunter and Francis Ward of the former Schrader concern were added to the Scovill Company directorate. David C. Griggs, vice-president and general manager of Waterbury Farrell Foundry, succeeded W. S. Fulton as president in February, Mr. Fulton becoming chairman of the board. Frank L. Squires was advanced from assistant to treasurer of that company.

In March W. H. Bassett of the American Brass Company was elected president of the American Institute of Mining and Metallurgical Engineers. Walter Smith of the Waterbury plant of the Chase Companies was made superintendent of the Chase plant in Cleveland. The Bullard Company, Bridgeport, brought out the Bullard-Dunn electro-chemical cleaning process. The Bristol Screw Corporation was formed in Bristol during March and the Yale and Towne Manufacturing Company of Stamford bought the Steubing Cowan Company, Cincinnati, and H. and T. Vaughn, Ltd., England. Elwin R. Hyde, president of the Bridgeport Safety Emery Wheel Company, died March 25. William M. Rule, former manager of the Torrington branch of the American Brass Company, died April 21.

George H. Benham, former treasurer of Holmes, Booth and Hayden, died April 9. Augustus H. Bullard, secretary and treasurer of the Bullard Company, died April 5. The Segal Lock and Hardware Company, Norwalk, bought the Norwalk Hardware Company in April. Veeder-Root of Hartford bought the Holo-Chrome Screw Corporation during that month. John H. Hurlbut, treasurer and general manager of Plume nd Atwood's Waterbury, died May 10. John P. Durfee, vice-president of the Waterbury Brass Goods Corporation, died May 21. The Scovill Manufacturing Company started two factory additions in May and the American Brass Company started a $500,000 building where some old shops of Holmes, Booth and Hayden formerly stood.

Charles E. Beardsley resigned as president and director of Beardsley and Wolcott Company and the Bridgeport Brass Company. Mason T. Adams, vice-president and general manager of

the Seth Thomas Clock Company, was made president of Beardsley and Wolcott and R. W. Reid of Providence was made vice-president and general manager. Warren Kaynor, president and general manager of the Waterbury Button Company, was made a director of Beardsley & Wolcott. Ralph L. Day, general manager, was made president of the Bridgeport Brass Company. The Beardsley and Wolcott Company reorganized and issued $206,250 of debentures. Roswell A. Moore, secretary-treasurer of the Waterbury Buckle Company, died June 1, and William E. Fulton, former president of the Waterbury Farrell Foundry, died June 2. Jerome R. La Vigne became general manager of the Waterbury Buckle Company, and Julius B. Smith, president of that company, also took on the office of treasurer.

The International Silver Company in June received a $175,000 order for the silverware for the new Waldorf-Astoria Hotel. The American Hardware Corporation was reported to have received two $250,000 orders for builders' hardware, one for the new Waldorf-Astoria, the other for the Empire State Building. In July William R. Webster, vice-president, was elected chairman of the board of the Bridgeport Brass Company. William H. Bristol, president of the Bristol Company, died June 18. Waldo C. Bryant, president and founder of the Bryant Electric Company of Bridgeport, died July 5. The Scovill Manufacturing Company, Chase Companies and the American Brass Company reduced the salaries of salaried employes to correspond to the cuts resulting from short time that the wage earners sustained. The Scovill Company inaugurated a plan to retire the debentures issued to buy the Schrader concern by having its subsidiaries buy the debentures and exchange them for Scovill common stock.

The Underwood Typewriter Company, Hartford, received in August what was said to be the largest order for school typewriters ever filled, three freight cars being required to carry the 1,973 machines to Detroit. Howard H. Bristol, former vice-president, was elected president of the Bristol Company in September. The Autoyre Company of Waterbury reorganized in October, all the former officers retiring, and the following being elected: President and treasurer, Leon Larner; vice-president, Charles Mosgrove; secretary, Burton J. Calkins.

In October Henry Brewer resigned as vice-president and secretary, and Leslie Thompson as vice-presidient and treasurer, of the Winchester Arms Company, and Edwin Pugsley, Clifford Babson and Thomas Johnson were elected vice-presidents; Richard Jack was elected treasurer and Arthur Hodgson was elected secretary. In November the Seth Thomas Clock Company, Thomaston, merged with the Western Clock Company, La Salle, Ill., a holding company being formed to take over the stock of both companies. Reginald P. Tracy, president and general manager of Manning, Bowman and Company, Meriden, died November 15. W. R. B.

Waterbury, Connecticut

JANUARY 2, 1931.

A relief program for the unemployed has now been put into successful operation by a citizens' committee. Over 1,700 men, believed to include all who are out of work and able and willing to work, have been given employment by the committee on public projects, such as street and park improvement and city clean-up. Funds are supplied through pledges of a certain percentage weekly of their salaries or wages of practically all who have employment, by individual donations, and by contributions from the treasuries of the local corporations. A constant weekly income of about $18,000 is thus assured, which the committee feels is sufficient to pay a living wage or provide charity for all those out of work.

The following firms are giving from their treasuries sums weekly equal to that subscribed by all their employes, and this latter includes large sums given by the higher officials, for they are making the same pledges as the other employes, the amount being about 3 per cent weekly of their salaries: American Brass Company, Scovill Manufacturing Company, Chase Companies, American Sheet Metal Works, American Metal Hose Company, American Ring Company, Blake and Johnson, A. C. Campbell, Inc., French Manufacturing Company, Kalbfleisch Corporation, Mattatuck Manufacturing Company, Patent Button Company, Platt Brothers, Smith and Griggs, Waterbury Buckle Company, Waterbury Clock Company, Waterbury Metal Wares Company, Waterbury Tool Company, Waterbury Rolling Mills, Waterbury Farrell Foundry, Waterbury Iron Works, and Waterbury Foundry. Over 90 per cent of the employes of all the local industries and business places are giving a percentage of their weekly income.

The monthly business survey of the Chamber of Commerce shows an increase of 115 persons employed in the industries of the city in November over the number employed the previous month. The eight largest factories employed 157 more, but there was a decrease in some of the smaller shops.

Among patents granted last month was one on a bouquet pin and another on seat attachments, both granted to **Lauritz Anderson** and **George A. King** of the **Scovill Manufacturing Company.**

Congressman E. W. Goss, son of the president of the **Scovill Manufacturing Company,** was sworn in as a member of Congress last month. One of his first steps was to visit the President to protest against the attitude assumed by the Federal Trade Commission toward legitimate industry. He had particular reference to the attempt of the Commission to prohibit the use of the word "silver" in connection with products known in the industry as "nickel silver." It has been a trade name recognized for three-quarters of a century, he said, and cannot be considered in any way as imposing on the public in the belief that the articles are of real silver. The attempt of the Commission failed, but for a time it threatened to disrupt industry in the state, he said. He said he thought the President should know how the Commission looks upon matters of this kind so that he may guard against the appointment of men to it who are unsympathetic or unacquainted with matters of legitimate industry.

The Men's Club of Bunker Hill inspected the plant of the **French Manufacturing Company** at its monthly meeting last month. **Leon H. French,** vice-president of the concern, guided them through it and sketched its history from the organization 30 years ago with a 25-horsepower steam engine and a 40-horsepower boiler to the vast factory it is today.

W. J. Austin, president of the Austin Company, through the efforts of **F. S. Chase,** president of the **Chase Companies, Inc.,** addressed the Chase Foremen's Association last month, and told what is being done by Russia under its five-year plan to reconstruct the industries of that country. W. R. B.

Connecticut Notes

JANUARY 2, 1931.

BRISTOL—William S. Ingraham, treasurer and general manager of the E. Ingraham Company, died December 14 at the age of 73. (See "Obituaries.")

Charles F. Olin, advertising manager of the **New Departure Manufacturing Company,** died December 25 after a long illness.

HARTFORD—The Plimpton Manufacturing Company declared a special dividend of 3 per cent, payable December 20. This brings the total payment for the year up to 9 per cent, the rate maintained for several years.

Arrow-Hart and Hegeman Electric Company has declared the regular quarterly dividend of $1.62½ on the preferred, and 75 cents on the common stock, both payable January 1.

BRIDGEPORT—Henry A. House, said to have invented the first self-propelled automobile in 1866, died here December 18, at the age of 90. He was one of the best known inventors of the East, and was long associated with Hiram P. Maxim. At the direction of the British government they constructed a steam-driven aerial warship that could navigate both the air and sea, but it did not prove successful.

STAMFORD—Francis H. Richards, said to have 1,000 patents to his credit, was given a gold medal by the American Society of Mechanical Engineers December 10. **Calvin Rice,** secretary of the society, and **Maxwell C. Maxwell,** general manager of **Yale and Towne,** presented the medal. He was formerly associated with the **Stanley Works.**

NEW HAVEN—The New Haven Clock Company directors have declared the regular quarterly dividend of 25 cents a share, payable January 1. The company now has 1,725 men employed, an increase of 250 since June, and is on a full-time

basis. It has received a large watch order from the Wrigley company, chewing gum makers, and is making electric clocks for Westinghouse Electric.

NEW BRITAIN—Stanley Works directors declared the regular quarterly dividend of 62½ cents a share, payable January 2 to stock of record December 12.

MERIDEN—International Silver Company directors have declared the usual quarterly dividend on the preferred stock of one and three-quarters percent, payable January 1.

BERLIN—An extra dividend of 50 cents a share has been declared by the Prentice Manufacturing Company. This is the second extra in the past year; total dividends for the year amount to 12 percent. The company has been working overtime for months.

TORRINGTON—A regular dividend of 75 cents a share and an extra dividend of 25 cents a share was declared by the **Torrington Company** directors last month.

WINSTED—A truckload of manufactured articles from the **William L. Gilbert Clock Company,** the **Fitzgerald Manufacturing Company,** and the **Union Pin Company** of this city, was destroyed while on the way to Boston last month. The machine caught fire from a short circuit. W. R. B.

Middle Atlantic States

Central New York

JANUARY 2, 1931.

With the removal, early in December, of the **William A. Rogers, Ltd.,** plant from Niagara Falls to Sherrill, an annual payroll of nearly one-quarter of a million dollars has been transferred to the Central New York district. The plant shut down in the Falls and all manufacturing units were moved to Sherill, where they were merged with **Oneida Community,** Ltd. The Rogers plant was purchased by Oneida Community more than a year ago, and was operated independently of the Sherrill unit since the date of purchase. In making the announcement of the closing, officials of the Niagara Falls plant said they had worked out a bonus service plan and that old employes, while thrown out of work, will receive bonuses, to be paid on a monthly payment plan. The merged firms manufacture silverware.

Edwin L. Andrew, connected with the **General Cable Corporation's** Rome, N. Y., plant for several years, has been selected manager of the "Alectral" sales. A new department will soon begin to manufacture this new type of insulated aluminum wire and cable. Mr. Andrew has directed the development of this product, which has been undertaken in the research, engineering and manufacturing departments of General Cable and the **Aluminum Company of America.** This work has been carried on both in Rome and at Perth Amboy, N. J., and directors of the company believe it is a most important step for a wire and cable manufacturer. **F. T. Bolster,** of the Rome company, will devote his entire time to the engineering details of the new product, the manufacture of which will be concentrated in the Rome plant. Other plants will fabricate those forms of insulation for which the Rome plant is not equipped.

Addition of the **Crescent Firearms Company's** production to that of the **Savage Arms Corporation,** Utica, N. Y., at the plant in Utica is to take place shortly. Pending completion of plans for removal of the Crescent business from Norwich, Conn., just bought by Savage, officials said they are not able to make any announcement as to the probable increase in employes. **E. A. McDonald,** treasurer of Savage, said removal work is to start shortly after New Year's. Early in 1930 Savage took over the **Fox Gun Company** business of Philadelphia. Its acquisition resulted in an increase of 70 men to the payroll of the Utica plant. The Crescent concern is reported to be a larger firm than Fox.

A slight drop from the preceding month in the employment situation in metal industry was reported at the office of the **Industrial Association** of Utica late in December. While the trend of business was reported to be slightly lower, the officials reported that the **Rome Wire Company** has a number of good-sized orders with which to start the new year. **Bradford Divine,** president of the Industrial Association, and leaders of metal industries in Utica, Rome and Ilion, were reticent when asked for reviews of the year and forecasts for 1931.

Henry Steinhorst of **Emil Steinhorst and Sons,** Utica, reports a substantial order for brass cans being made by the company for an out-of-the-city concern.

Officials of the **Partlow Corporation,** Utica, makers of thermostatic controls, report sizeable orders from American Can, Continental Can, National Carbon, and U.S.L. Battery.

E. K. B.

Rome, New York

JANUARY 2, 1931.

The big Rome plants of the Revere Copper and Brass, formerly the Rome Brass and Copper Company; the plants of the General Cable Corporation, the Spargo Wire Company and the Rome Company, Inc., makers of beds, all look for improvement in business in the first quarter of 1931 over the last quarter of 1930.

This expectation is based on business in sight, and general indications are that 1931 will be a much better year than 1930. The widespread depression throughout the country and the world was felt quite severely in the local industrial plants, but beyond a doubt the earnings of some, among which is Revere Copper and Brass, compare favorably with the earnings of any similar industry in the country.

Unemployment has been extensive, especially in the wire-working industry, but there improvement is in sight, in that more people are being taken on daily, and still more will be employed when inventory activities have been completed and the regular run of business is given full attention.

There has been some extensive building and general plant expansion here in the past three or four years, and some plans for ordinary expansion will be carried out this year too, although no extensive plant or office building plans have been announced for the new year as yet.

Not in many years has there been any semblance of labor disturbance in any of the big industries of this city, and there is not the slightest sign now. Hundreds of workmen, many of them skilled mechanics, have had to depend on short time for a considerable portion of 1930, and many more were out of work entirely, but there seems to be a spirit of loyalty on the part of all the help, and this promises to continue for years to come.

Never before were the metal working plants of this city in better shape for handling big orders, and it is expected that with the return of business prosperity, Rome will have its full share.

W. P. D.

Newark, New Jersey

JANUARY, 1, 1931.

DeWitt Tool Company of 244 Lafayette Street, New York, dealers in machine tools and equipment is expanding the business and has leased a property at 17 William Street, Newark, for a showroom and branch office. The rise in copper prices has caused encouragement at the plant of the **United States Metals Refining Company,** Carteret, N. J. Large stocks of copper have been on hand awaiting shipment and the present move to curtail production and increase prices is expected to bring about the release of the finished product and give way for new activity at the plant.

Gebbe Products Corporation, New York, has leased a part of the building owned by the **Orange Lighting Fixture Company,** 60 Hoyt Street. The new tenants manufacture typewriter supplies.

Foster Wheeler Corporation, Carteret, is building a laboratory and experimental station. It will be two stories, 60 by 70 feet. The work on the structure is being done by the employes of the company. Foster Wheeler erected a pattern building 300 by 600 feet in the rear of its main plant during the past season. The plant is operating on full schedule.

The following Newark concerns have been chartered: **Industrial Metal Company,** $50,000 preferred and 1,000 shares

common, to manufacture metal products; **Franken Chemical Company,** 3,500 shares common; **Electrical Clock Sales Corporation,** manufacture clocks, $100,000; **Sno-Melt Corporation,** manufacture chemicals, 1,000 shares common; **Economy Welding and Body Company,** welding, $100,000. C. A. L.

Trenton, New Jersey

JANUARY 1, 1931.

The past year has been a peculiar one in the metal industry in Trenton, with many ups and downs during the season. Some of the larger plants felt the depression as well as the smaller ones, but also found busy spells. The Edgely Brass Company, of Edgely, Pa., formerly the Trenton Emblem Company, announces that it has seen one of the poorest seasons on record. The John A. Roebling's Sons Company and the J. L. Mott Company had spurts of business and are now operating normally.

Hobson Flatware Company, Lambertville, N. J., plant was to be sold at receivers' sale on December 29, 1930. The receivers are William A. Walsh and William E. Meginnis. It is reported that the concern lost about $15,000 since the receivers took hold, due to the stress of the times, and that about $100,000 additional capital will be required to put the equipment in the plant that is needed to operate it at a profit. The plant was organized to manufacture all kinds of metal ware.

Federated Metals Corporation, Trenton, has been awarded reparation by the Interstate Commerce Commission amounting to $602, against the Pennsylvania and Baltimore and Ohio Railroad companies for excess freight charges. The commission found that rates charged on shipments of zinc from points in Pennsylvania to Trenton were excessive.

Siegfried Roebling, vice president of the **John A. Roebling's Sons Company,** has contributed $15,000 toward clearing up the debt on the Trenton Boy Scouts' recreation grounds. Mr. Roebling is greatly interested in the Boy Scout movement. **Ferdinand W. Roebling, Jr.,** president of the same concern, contributed $10,000 toward the unemployment fund in Trenton. Mr. Roebling is chairman of the Special Gifts Committee.

Herbert Manufacturing Company, has been chartered here to manufacture fountain pens. **John Malone** of Jersey City, is at the head of the company.

Following concerns have been chartered at Trenton: **Herman Ellis Metal Company,** $125,000, Bradley Breach; **Triangle Chemical Products, Inc.,** 200 shares common, Matawan; **Federal Welding Works, Inc.,** $50,000, East Orange; **G. and E. Chemical Company, Inc.,** $50,000, chemicals, Atlantic City; **Weld-Rite Corporation,** metals, $50,000, Bayonne; **Karmak, Inc.,** stamp, smelt and refine ores, 5,000 shares common, Elizabeth. C. A. L.

Middle Western States

Detroit, Michigan

JANUARY 2, 1931.

The year 1930 has slipped into history, marked as one of the most trying, from a business standpoint, in the history of the nonferrous metal industry. Manufacturers in precious metals such as gold, silver and platinum have a story all their own. The plating industry also has had its troubles.

Some quite substantial concerns struggled along for a time early in the year and finally gave up, liquidated or slipped out of business through the receivership route. And the end is not altogether in sight. There may still be others to go, but there are not so many as were headed out when 1930 was young. Most of the concerns that have come to grief should never have started in business, financial experts are heard to remark. They lacked the careful direction necessary for ultimate success, no matter which way the business trend might have been. With their passing industry is being purged, and it will make for better conditions in the new year.

The foregoing seems to be the opinion of manufacturers in general. Nearly every one is looking for a change within the next few weeks. No one believes it will come with a rush, but a gradual upward trend is confidently expected after the close of the national automobile shows this month. This always brings new life to the motor car industry, which must always precede betterment in other manufacturing lines in this area.

Clayton and Lambert Manufacturing Company, Detroit, elected officers at its December meeting, **Charles F. Lambert** is president; **John R. Russell,** vice-president; **Otto J. Groehn,** vice-president and general manager; **Arthur F. Rohrbach,** vice-president; **George W. Millen,** secretary and treasurer.

G. and C. Plating Works, 2019 Spruce Street, Detroit, has recently incorporated with capital stock of $10,000. It is engaged in general plating and polishing. The incorporators are William H. Geal, Daid Cunningham and James Swan Eldridge.

Ideal Plating Company, 641 East Vernor Highway, Detroit, is a new Michigan corporation. The owners are Christ Kellar, Harold M. Silverston and Harry Wolf.

Eureka Vacuum Cleaner Company, which for two months operated only four days a week, has gone into full production on a six-day week basis, it is announced by **Fred Wardell,** president. Whereas production has been about 400 units a day, it now has reached 1,100 units. Mr. Wardell said this increase in demand for cleaners is an indication that general business is about to head upward again.

F. J. H.

Toledo, Ohio

JANUARY 2, 1931.

Manufacturers in this area have no regrets as the old year passes into history. It has been one of the most trying in many decades. Just what the future has in store few are brave enough to forecast. Hopes are strong, however, that much better things are awaiting than is generally thought. Forecasts with positive assurances of immediate improvement in business have been so numerous and unreliable, nevertheless conditions in the manufacturing field might be worse in Toledo. Also there are some evidences that business in general will begin to improve before the end of January.

The first symptom of returning activity usually appears in the motor car industry, and at this date much seems to be leading up to it. The accessory plants already show signs of getting under way again and this, of course, is the result of a more promising outlook in the motor car field.

Plating, no doubt, will begin to pick up again with the accessory plants. A year ago everything pointed to curtailment and a decided decrease in employment. Now, in general, the outlook is the reverse. The bottom has been reached and the only thing to do is to climb. Just how rapid that will be remains to be seen.

F. J. H.

Wisconsin Notes

JANUARY 2, 1931.

A marked upward trend in the number of inquiries for orders received is reported by a number of Milwaukee metal concerns. **W. J. Fairbairn,** Milwaukee district secretary of the **National Metal Trades Association,** states that five or six factories included in the metal trades group have reported such a trend. Indications point to a revival of business within the next six months, with a return to almost normal conditions by the end of next year.

Milwaukee Valve Company is enjoying about the best year in its 29 years of producing brass products and heating specialties. The greatest output by the valve company was reported in 1929, but 1930 came within 10 per cent of the 1929 mark and the actual number of units produced in 1930 was more than the preceding year.

Wisconsin's first arc welding clinic was held December 1, 2 and 3 by **Marquette University** and the **Northwestern Manufacturing Company,** in Milwaukee. Displays and demonstrations were held at the university gymnasium, together with talks and illustrated lectures. One of the features of the display were samples of nearly every kind of arc welding work, which was furnished by Wisconsin manufacturers. Among the speakers were **W. M. Dunlap,** research engineer for the **Aluminum Company of America,** who discussed "Electric Arc Welding of Aluminum"; and **I. T. Hook,** research engineer for the **American Brass Company,** who talked on "Metal Arc Welding with Copper Alloys."

Work has been started on an addition to the **Aluminum Specialty Company** plant at Manitowoc. The new structure will give the plant 7,200 additional feet of floor space. Increased business made the addition to the plant necessary.

The Metalware Corporation, Two Rivers, Wis., through **President Remus Koenig** and **Secretary William Halberg,** has filed an amendment to its articles of incorporation, increasing the capital stock of the company from $350,000 to $400,000. This stock is divided into 3,000 shares of common and 1,000 shares of preferred stock. In 1923 the company's capital stock was increased from $300,000 to $350,000.

J. C. Haimerl and **F. F. Koehler,** both of Waukesha, Wis., have purchased the Northwestern roundhouse in Baraboo, involving a transaction of about $20,000, and will open a new iron and aluminum industry in the building. Both men were formerly connected with the **Glancy Malleable Corporation** in Waukesha before coming to Baraboo.

A. P. N.

Other Countries

Birmingham, England

DECEMBER 19, 1930.

With the approach of Christmas, producers of novelties in non-ferrous metals have been busy on account of the gift season. General trade, however, continues dull, and with some firms the scarcity of orders was acute. Early in the month strong copper advanced and a number of prices for brass and copper tubes were increased in sympathy, but the firmer position of the raw metal was not maintained and it is expected that these commodities will again be reduced. Several firms in the tube trade have contracts which keep them actively engaged, although in a few cases customers have suspended delivery. The demand for conduit tubes in the electrical industry has been well maintained, owing to the fact that electrical engineering is one of the bright spots in British industry.

A slight improvement has been experienced among makers of brass water fittings, but there is a good deal of unemployment in this industry. Most of the business is for home consumption as several of the main export markets are providing very little in the way of new orders. Brass founders complain of the unprofitable state of the industry generally. Prices are cut severely and profits are inevitably reduced to the minimum.

Short-time schedules are in effect in the aluminum hollow-ware plants of the Midlands. The seasonal trade usually experienced just before Christmas did not approach the volume of recent years; one manufacturer describes it very effectively by saying that they only had orders for the bare necessities of the Christmas trade. Australia and New Zealand used to be very big customers but in the former the trading has been stopped by the luxury tax and in New Zealand business is crippled by heavy tariffs. India and Ceylon are also very unremunerative markets now.

Statistics which have been issued in regard to cold blast products show that exports from Britain of sheets and strip in 1930 will be something like half of those of 1929. The wire mills have had a difficult task to maintain their position in overseas markets and there has been a drop of over 20 per cent in shipments. South Africa orders have shown some improvement recently, the demand for electrical fittings being very brisk.

There has been a good deal of unemployment in the hearth furniture trade and the great demand for cheapness—this being the first consideration in many cases—has reacted adversely upon the brass founders who specialize in this line. Holland is a formidable competitor in art metal work, which is produced in Birmingham at a number of works. Stocks in retailers' hands this year have been unusually heavy, owing to the limited spending power of the public. Consequently, manufacturers have not felt any benefit from the occasional spurts in retail business.

Chromium plating has become the standard finish on popular cars and is also used extensively in the embellishment of the road motor coach, omnibus and street car. Firms supplying equipment for this kind of plating have been kept fairly busy throughout the year.

Dr. Walter Rosenhain, in a recent lecture at Birmingham, referred to a new metal which is lighter than magnesium, the "lightest" metal, and is as valuable as the same volume in gold. He has been experimenting at the National Physical Laboratory, London, and has found that this new metal, which is known as beryllium, is, under certain conditions, as hard as steel.

Dr. O. F. Hudson, speaking to the Birmingham Association of Mechanical Engineers, described recent developments of non-ferrous alloys.

J. A. H.

Business Items—Verified

R. F. Lamar and Company, Pueblo, Col., manufacturer of playground apparatus, plans installation of equipment for cadmium plating and would like to have literature on equipment and supplies.

Bruner Company, San Antonio, Tex., plumbing supplies manufacturer, is planning installation of a small lead smelting unit for battery plate reduction, and would like to hear from firms supplying equipment for the purpose.

E. D. Munson and Son, Mineola, N. Y., have started production of chemically engraved metal name plates and signs, etched clock dials, and metal advertising novelties. The firm has been making lithographed name plates since 1900.

Pangborn Corporation, Hagerstown, Md., announces the opening of district sales offices in Cincinnati and Milwaukee, effective January 1, 1931. An innovation is the appointment of **Thomas J. Dougherty** as a special sales engineer at the home office to cover the Hagerstown district.

American Bronze Corporation, has been organized by the officials of the **Universal Brass Works, Inc.,** 139 South East Street, Indianapolis, Ind., as an affiliated interest to operate a local foundry for the production of bronze specialties. The Universal Brass Works has been reorganized with capital of $15,000.

Titan Metal Manufacturing Company, Bellefonte, Pa., is building a 60 x 200 ft. extension to their brass rod mill to enable them to give better service to customers, with small brass rod and welding rod. The new mill should be in operation by March first. **Edwin S. Harter** and **C. M. Carleton** head the companies.

Advance Metal Company, Brooklyn, N. Y., recently incorporated with a capital stock of $20,000, has opened a scrap metal plant at 127 Withers Street. **Clara Berman** is president; **Rose Horowitz,** vice-president; **Mary Brown,** treasurer; **Sonia Burstock,** secretary.

Detroit Brass and Malleable Works, Holden Street, Detroit, Mich., has arranged for an increase in capital from $1,650,000 to $2,350,000, for general expansion. The following departments are operated: brass, bronze foundry, brass machine shop, tool room, casting shop, stamping, plating, polishing, grinding room, lacquering, japanning.

Robinson Manufacturing Corporation, 17128 Filer Avenue, Detroit, Mich., recently organized by **Frederick R. Robinson,** and associates, with capital of $100,000, plans operation of a local factory for the manufacture of brass, bronze, aluminum and other metal products. **Harry A. Codde** is interested in the new company.

Eastern Valve Company, Hanover, Pa., recently organized by **J. V. Emig,** Hanover, and associates, with capital of $30,000, plans operation of a local factory for the manufacture of valves and kindred engineering specialties. The company operates the following departments: machine shop, assembly, polishing, grinding room. **Frank Drais,** Highland Township, Adams County, Pa., will be one of the heads of the new company.

The Roessler and Hasslacher Chemical Company, New York City, have an interesting exhibit at the Architects Samples Corporation, 40th Street and Park Avenue, New York City, showing various architectural products of manufacturers using their plating chemicals and ceramic materials. The Window Exhibit attracted considerable attention not only from a technical standpoint but also favorable interest from the general public.

Industrial Metal Company, Inc., has been formed, with headquarters at Newark, N. J., as a result of acquisition by **Hudson Smelting and Refining Company,** Newark, of an interest in the Industrial Metal Company of Newark. Officials are **I. W. Wilenchik** president and general manager; **J. W. Paterson,** vice-president and treasurer; **G. E. Friedel,** secretary. A new plant is under construction at 85-95 Hyatt Avenue, Newark. The company produces non-ferrous metals.

American Metal Company, Ltd., has initiated a department devoted to the manufacture of solder, high-grade babbitt, terne metal, and similar white metal alloys, that will meet the special specifications of consumers. The company, which is a large producer of virgin white metals and a large importer of virgin tin, has begun purchasing tin-containing scrap and residues through its New York headquarters at 61 Broadway, and its Chicago offices at 1 La Salle Building.

Lewis Roe, 1050 DeKalb Avenue, Brooklyn, N. Y., manufacturer and distributor of plating and polishing equipment and supplies, announces that, effective January 1, 1930, his firm will be known as **Lewis Roe Manufacturing Company.** The company makes pieced and canton flannel buffs, roller bearing polishing lathes and tanks. In the near future nickel, brass and copper anodes will be produced, it is expected. Suitable location a short distance from New York is being sought for establishment of quarters capable of housing larger production facilities in order to keep up with enlarged business

Correction

Demco, Inc., engineers and designers of machinery, were erroneously reported in the last issue as being located at Camden, N. J. The correct address is 1400 Bush Street, Baltimore, Md.

Review of the Wrought Metal Business

The Past Month and Year and a Forecast for 1931

By J. J. WHITEHEAD

President of the Whitehead Metal Products Company of New York, Inc.

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

JANUARY, 2, 1931.

During the month of December all metal markets are usually "dead," and this year certainly was no exception. Everyone was trying to reduce inventories and clean up the year's business. Copper most of the month was inactive, and this state of affairs will probably continue during the next few weeks. What is true of copper also applies to aluminum, Monel metal, nickel and, in fact, all metals. As a matter of fact, these markets are now following along with the general business situation. They will undoubtedly continue to do just this thing until such time as exceptional demands will be made for any or all of these metals, at which time they will break out of the trading range and again stand out.

The Past Year

With the passing of 1930 we close a chapter in our industrial history that is outstanding. Never have we been through such a severe depression and never have the fluctuations in the prices of copper and its products been so wide. It is for this very reason that relatively the situation has created such unsatisfactory conditions. However, the pessimistic frame of mind is by far the worst part of the depression. The actuality is not really as bad as we think it is.

In the early part of 1930 the price of copper was 18c, and from here it dropped with a few slight halts to 9½c. It jumped to 12c on news that the copper producers had agreed in November to curtail output so as to balance consumption and production, but it again slipped off to between 10c and 10½c. Just before the jump in price from 9½-10c to 12c, European buyers came into the market for a fairly large tonnage. At 12c, however, practically all demand for the metal either from users here or abroad ceased. Some users were buying metal at the 10¼c to 10½c level that obtained the latter part of December.

So far all this has been past history with which, if you are in the metal business, you are familiar. Probably you are much more interested, along with the rest of us, in what the future has in store.

The Outlook for 1931

While the stocks of copper are large, they are increasing very little, if at all. It should be remembered that considerable of this refined copper has been sold but not delivered. Besides, consumption and production are now fairly well balanced. If this is true, and we have really had the worst part of the depression, it is only reasonable to expect that from now on the stocks will every month become smaller and smaller as business improves. The price of the metal will not run away on the up side, and certainly no one wants it to. The best thing that could happen is that the price of the metal and its products would remain at a definite level for a long time to come, provided that level is neither too high nor too low. The main thing is to re-establish confidence. There are no large stocks of copper or products fabricated from it in the hands of consumers, and this is a very favorable factor. Any pick-up in business from this level will be immediately reflected in the demand for copper or its alloys and its products. By April or May a substantial demand may develop. It is believed that business activity all along the line will be much improved by then.

If business picks up materialy by spring, a very substantial demand for nickel will become apparent. As a matter of fact, the demand for nickel has kept up because there are no stocks of this material in the hands of consumers. If you are going to use nickel, be sure to keep your requirements covered, as it is not beyond the realm of possibility that it might be hard to obtain prompt deliveries in April.

What is true of nickel is also true, but to a somewhat lesser extent, of Monel metal. The outlook for these materials is good. The prices have held and "the slates are clean."

Aluminum is following the trend of general business—on an even keel with stable prices. A revival here will not take too long to get under way when once it starts.

Probably there are a few more weak spots to clean up, and then the financial horizon will begin to get brighter. The credit situation is good and the reduction in the reserve rate to 2 per cent

should make everyone sit up and note that the gloom overhanging everything is not warranted, and that things are really not as bad as we make them out to be. That they could be better goes without saying, but it is always darkest just before the dawn. It is not anticipated that everything will straighten out overnight, but the money situation is coming around; building, it is indicated, will soon be a bit better; prices of steel have been advanced and so far maintained; commodity prices are more stable; employment is fairly steady; unfilled steel tonnage is improving; the railroad situation is getting some needed attention; and, all in all, there is no question but what the leaders of our industries are really working and giving serious thought to straightening out the tangle. In other words, "it won't be long now," as such things are measured, before a real improvement will be noted. By this time next year, on looking back, to Christmas, 1930, some of us will wonder why we ever passed up certain of our opportunities.

The year 1931 should be faced with resolution and confidence.

Metal Market Review

By R. J. HOUSTON
D. Houston and Company, Metal Brokers, New York

WRITTEN ESPECIALLY FOR THE METAL INDUSTRY

COPPER

JANUARY, 2, 1931.

Numerous and varied changes in the copper situation were written into the records of 1930. The declining trend of values was an outstanding feature, and prices reached the lowest point in 35 years. During the first three and a half months of the year the domestic price of electrolytic remained fixed at 18 cents per pound. Buying during this period was in fair proportions, although demand was mostly for prompt shipment. There was a steady and continuous increase of surplus stocks of copper each month from the beginning of the year. The accumulation of refined copper in primary hands at the end of the first quarter of 1930 amounted to nearly five times as much as the quantity held a year previous. It was obvious early in 1930 that there was a pronounced decrease in consumption, and the various channels of distribution were unable to absorb output fast enough to maintain the situation in a sound condition.

The copper market began to feel the cumulative adverse effects of heavy unsold stocks and inability to move them in volume early in second quarter of the year. Producers consequently made a drastic cut about that time to 14 cents a pound. The reduction of four cents a pound at one stroke of the pen stimulated buying, to some extent, especially for export, but uncertainty continued to hover over the market. Successive price declines followed quickly during subsequent months of the year until a low of 9½ cents was reached during the last half of October.

A tremendous tonnage of copper was sold as prices continued their downward course. During the last half of the year there were periods of recovery and weakness, but a vigorous rally was impossible owing to huge visible supplies and the prevalence of general business and industrial depression.

An outstanding development of the year was the agreement by the leading producers of the world to curtail production. The need for this action is apparent and imperative if the industry is to operate for profit and not for loss. This is a matter which will depend upon producers entirely for its outcome. If output is balanced in keeping with demand the problem of over-supplies will be solved. The curtailment movement is conspicuously necessary. It will be beneficial to consumer and producer, and if the process is faithfully carried out it will bring about a stronger, healthier and better situation in copper than has previously existed. The proposition is a distinctly encouraging feature, and offers ground for hope that 1931 will prove a brighter and more prosperous year for copper than 1930. Market at this writing is firmer at 10½ cents for domestic delivery and 10.55 cents c. i. f. European ports. Foreign demand has been excellent recently. Fundamental betterment is looked for in copper during 1931. In due course copper will emerge from present conditions into vigorous activity that will eventually absorb every pound of surplus stocks.

ZINC

In Zinc, as in all other markets for metals, low prices and market irregularity were outstanding features in 1930. The year opened with prime western slab zinc at 5.45 cents per pound East St. Louis basis. The low point of the year was recorded October 15, when the sales price touched 3.95 cents East St. Louis delivery. The high in 1930 was 5.45 cents on January 12. This latter figure was the low point in 1929. There was an excellent demand at times reflecting a large volume of domestic consumption. The domestic need for zinc last year, however, showed a pronounced decrease compared with the previous year. Surplus stocks in the hands of producers have increased each succeeding month of 1930 to November of that year. The amount on hand December 1 being 142,838 tons against 75,430 tons on January 1, 1930, an increase of 67,408 tons. There has been some curtailment of production, but it has not been enough to rectify an oversupplied market. It is obvious that heavy stocks must be worked off before the zinc industry is on the profitable basis necessary for adequate commercial success. The year closed with the market firm but quiet at 4⅛ cents East St. Louis and 4.47½ cents New York.

TIN

The tin market has been overshadowed by events which proved highly unfavorable to values during the past year. Overproduction and excessive supplies were obviously depressing factors. These conditions were followed by the inevitable consequences of lessened confidence and declining prices. Widespread business depression also contributed its share in bringing about drastic price recessions. Between January and December the price of prompt Straits tin fell from 39¾ cents a pound to 23¾ cents, a drop of 16¼ cents per pound. These figures represented the high and low quotations during 1930.

As is well known, tin is liable to highly volatile market movements. It has long been a favorite medium among the metals for speculative manipulation by London and New York operators. Values have, therefore, undergone alternating spurts of strength and sharp recessions. These peculiarities were specially conspicuous last year. Technical conditions, however, were unusually disturbing lately, owing to the lack of adjustment of supply to demand and tedious delay in organized action to prevent superfluous production.

A new plan for restriction of tin exports was announced in London recently to embrace practically 90 per cent of the world's production. The new international quota agreement will take effect January 1, 1931, and continue in force for a period of two years. It is understood that the maximum quotas to be exported per country will be based on their respective production figures for 1929. Announcement of the new scheme caused a sharp price advance at both London and New York. The net advance recorded in the last half of December for prompt Straits tin was 3¼ cents as compared with the low point during that period. The purpose of the agreement is to reduce present heavy accumulation of visible supply and improve the market status of the metal. World's visible supply of tin on December 1, 1930, amounted to 40,811 tons, as against 28,140 tons on January 1, 1930, an increase of 12,671 tons. American deliveries for the first 11 months of 1930 were 70,730 tons, compared with 83,370 tons for the corresponding months of 1929, a decrease of 12,640 tons. Market showed an advancing tendency at month-end, with prompt Straits tin quoting 26¾ cents.

LEAD

Activity in lead during 1930 was on a large scale, cable makers, corroders, and various other users taking large tonnages. The domestic consumers, however, did not have annual requirements

equal to 1929. There was a distinct falling off of demand as compared with shipments to the heavy industries in the year previous. Manufacturers of cables should be excepted in this statement as their takings approximated very close to those in 1929, the difference being less than fifteen hundred tons. Ammunition makers increased their requirements by more than 6,000 tons in the first 11 months of last year. There was a heavy shrinkage in deliveries during the last half of 1930. American stocks of refined lead on December 1, 1930, amounted to 90,402 tons, against 51,076 tons on January 1st and 42,015 tons on May 1st, the low for 1930. Production showed substantial curtailment in November especially, but output is still much greater than consumption. The year closed on the basis of 4.95c East St. Louis and 5.10c New York. This is the low of the year. The high in 1930 was 6.10c East St. Louis and 6.25c New York.

ANTIMONY

Interest in the antimony market during the past year was continuously conservative. Price fluctuations in this metal were not so severe as for other major metals, although there was considerable irregularity recorded in market values, with a difference of 2½ cents a pound between the high and low points during 1930. The high point for Chinese regulus was 9¼c, duty paid, reached in February, and the low 6¾c, touched in July. Present price quotes 7.10c duty paid. Trading was confined to moderate quantities. Offerings from China were also limited, conditions in that country being still unsettled. Bonded stocks on December 1st were only about 760 tons, showing a decrease of approximately 330 tons compared with November 1st.

ALUMINUM

Primary aluminum has been going into consumption in good volume, although below maximum rate. Prices, however, are maintained without variation by the dominant interest. Secondary, or re-melt aluminum, is subject to more frequent fluctuations, according to the extent of inquiry from consumers. Demand for the secondary article was dull, but offerings were moderate. Advices from abroad state that Europe is extending its outlet for foreign aluminum at European centers. Development of the industry in Italy is proceeding on an important scale. The Swiss authorities have imposed a higher import duty on aluminum to protect producers in that country. Exports of aluminum from Canada during the first eleven months of 1930 amounted to 34,422,800 pounds, as compared with 65,648,600 for same period in 1929.

QUICKSILVER

Conditions were dull lately and prices have declined to $104 to $106 per flask of 76 pounds. Holders were forced to make concessions, and present quotations compare with $121 to $122 early in 1930.

PLATINUM

The position of this metal has been noticeably easy lately. Price of refined platinum has receded to $33 or thereabouts per ounce, and that figure compares with $63 early in 1930. Producers are to make efforts to increase the use of the metal in industry and thus provide a broader outlet for the increase in production that is expected.

SILVER

Silver has been under constant pressure lately and prices sharply lower rendering the position of the white metal unusually disturbing. The lowest price on record was established on December 30, 1930, of 30¾ cents an ounce. This compares with 46⅞ cents on January 2, 1930. The unprecedented fall in silver prices is chiefly owing to heavy sales during the year by China and French Indo-China, increase in recent years in world production, and restricted use of silver as currency. A large quantity of silver produced annually is a by product of base-metal production, and this factor will continue to operate regardless of the price. The Irving Trust Company in its Review of Business for December has a most timely and interesting article on the Problem of Silver. We are told that half the world's population still uses silver as its money metal—India, China, Mexico, Abyssinia and a few other countries. In the light of that fact the silver situation is therefore one of fundamental importance.

OLD METALS

Secondary metals constitute a large proportion of the metallic supplies used in industry. An impressive volume of scrap material is therefore consumed annually, and prices for standard grades of old metal follow closely the market trend of new material. The production of secondary copper by primary refineries in 1929 amounted to 308,000,000 pounds, or 76,000,000 pounds more than in 1928. Market prices on old metals fluctuated frequently in 1930, often in the descending scale and to very low levels. Everybody has been conservative lately, but a somewhat firmer tone prevailed at year-end for the copper and brass grades. Quotations are given on page 53.

Daily Metal Prices for Month of December, 1930

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	2	3	4	5	8	9	10	11	12	15	16	17
Copper c/lb. Duty Free													
Lake (Del.)	11.375	11.625	11.625	11.375	11.375	11.125	11.125	11.125	11.125	11.125	11.125	10.625	10.625
Electrolytic (f.a.s. N. Y.)	11.25	11.50	11.50	11.25	11.25	11.00	11.00	11.00	11.00	11.00	11.00	10.50	10.50
Casting (f.o.b. ref.)	11.00	11.25	11.00	11.00	11.00	10.75	10.50	10.50	10.25	10.25	9.75	9.50	9.50
Zinc (f. o. b. St. L.) c/lb. Duty 1⅜c/lb.													
Prime Western	4.075	4.075	4.075	4.10	4.15	4.175	4.175	4.175	4.15	4.10	4.05	4.00	4.00
Brass Special	4.175	4.175	4.175	4.20	4.25	4.275	4.275	4.275	4.25	4.20	4.15	4.10	4.10
Tin (f. o. b. N. Y.) c/lb. Duty Free													
Straits	26.00	25.85	25.75	25.50	25.45	25.00	25.00	25.125	24.20	24.30	23.75	23.85	23.875
Pig 99%	25.20	25.00	24.875	24.625	24.625	24.35	24.125	24.25	23.375	23.50	23.00	23.00	23.00
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95	4.95
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.													
Ingot	35	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	35	35	35	35	35	35	35	35	35	35	35	35	35
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10	7.10
Silver c/oz. Troy Duty Free	34.875	34.75	34.75	34.125	34.125	34.00	33.00	33.50	33.625	32.25	32.875	31.625	31.875
Platinum $/oz. Troy Duty Free	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00

	18	19	22	23	24	*25	26	29	30	31	High	Low	Aver.
Copper c/lb. Duty Free													
Lake (Del.)	10.125	10.125	10.375	10.375	10.625	....	10.625	10.625	10.625	10.625	11.625	10.125	10.886
Electrolytic (f.a.s. N. Y.)	10.00	10.00	10.25	10.25	10.50	....	10.50	10.50	10.50	10.50	11.50	10.00	10.761
Casting (f.o.b. ref.)	9.75	9.75	10.00	10.00	10.25	....	10.25	10.25	10.25	10.25	11.25	9.50	10.318
Zinc (f. o. b. St. L.) c/lb. Duty 1⅜c/lb.													
Prime Western	4.00	4.00	4.10	4.10	4.10	....	4.15	4.125	4.125	4.125	4.175	4.00	4.097
Brass Special	4.10	4.10	4.20	4.20	4.20	....	4.25	4.225	4.225	4.225	4.275	4.10	4.197
Tin (f. o. b. N. Y.) c/lb. Duty Free													
Straits	24.10	24.50	25.50	25.45	26.375	....	26.75	26.875	26.45	26.20	26.875	23.75	25.266
Pig 99%	23.25	23.625	24.625	24.60	25.50	....	25.875	26.00	25.625	25.375	26.00	23.00	24.427
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	4.95	4.95	4.95	4.95	4.95	....	4.95	4.95	4.95	4.95	4.95	4.95	4.95
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	....	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.													
Ingot	35	35	35	35	35	....	35	35	35	35	35	35	35
Shot	36	36	36	36	36	....	36	36	36	36	36	36	36
Electrolytic	35	35	35	35	35	....	35	35	35	35	35	35	35
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	7.10	7.10	7.10	7.10	7.10	....	7.10	7.10	7.10	7.125	7.125	7.10	7.101
Silver c/oz. Troy Duty Free	31.25	31.625	32.375	31.875	31.625	....	31.625	31.375	30.75	31.125	34.875	30.75	32.682
Platinum $/oz. Troy Duty Free	33.00	33.00	33.00	33.00	33.00	....	33.00	33.00	33.00	33.00	33.00	33.00	33.00

*Holiday.

Metal Prices, January 12, 1931

NEW METALS

Copper: Lake, 10.375. Electrolytic, 10.00. Casting, 9.75.
Zinc: Prime Western, 4.00. Brass Special, 4.10.
Tin: Straits, 25.75. Pig, 99%, 24.875.
Lead: 4.55. **Aluminum,** 23.30. **Antimony,** 7.50.
Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
Quicksilver: flask, 75 lbs., $105. **Bismuth,** $1.25.
Cadmium, 70. **Cobalt,** 97%, $2.50. **Silver,** oz., Troy (N. Y.) official price (January 13) 30.125.
Gold: oz., Troy, $20.67. **Platinum,** oz., Troy, $33.00.

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	8 to10
Brass Ingots, Red	10¼to12½
Bronze Ingots	11 to14
Casting Aluminum Alloys	21 to24
Manganese Bronze Castings	22 to37
Manganese Bronze Ingots	9½to11
Manganese Bronze Forgings	35 to43
Manganese Copper, 30%	23 to30
Monel Metal Shot	28
Monel Metal Blocks	28
Parsons Manganese Bronze Ingots	16 to18
Phosphor Bronze	11 to13
Phosphor Copper, guaranteed 15%	14¾to16
Phosphor Copper, guaranteed 10%	14 to15½
Phosphor Tin, no guarantee	33 to40
Silicon Copper, 10%, according to quantity	25 to35

OLD METALS

Buying Prices		Selling Prices
8¼to 8¾	Crucible Copper	9½to 9¾
8 to 8½	Heavy Copper and Wire	9 to 9½
7⅜to 7⅝	Light Copper	8⅛to 8⅝
5 to 5¼	Heavy Brass	6 to 6¼
4 to 4½	Light Brass	5 to 5½
7¼to 7½	No. 1 Composition	8½to 9
6¾to 7	Composition Turnings	8 to 8½
3½to 3¾	Heavy Lead	4½to 5½
1⅞to 2⅛	Old Zinc	2⅞to 3½
2½to 2¾	New Zinc Clips	3½to 4½
11½to12½	Aluminum Clips (new)	13 to15
4½to 5	Scrap Aluminum, cast, mixed	6½to 8½
7½to 8¼	Scrap Sheet Aluminum (old)	9 to11¼
16½to17½	No. 1 Pewter	19½to21½
20 to22	Nickel Anodes	22 to24
Nickel scrap (new)		24 to28

Wrought Metals and Alloys

COPPER SHEET

Mill shipment (hot rolled) .....20¼c. to 21¼c. net base
Front Stock .....21¼c. to 22¼c. net base

BARE COPPER WIRE

12¼c. to 12½c. net base, in carload lots.

COPPER SEAMLESS TUBING

22⅝c. to 23⅝c. net base.

SOLDERING COPPERS

300 lbs. and over in one order .....18¾c. net base
100 lbs. to 300 lbs. in one order.....19¼c. net base

ZINC SHEET

Duty on sheet, 2c. per lb.	Cents per lb.
Carload lots, standard sizes and gauges, at mill, less 7 per cent discount	Net Base 9.50
Casks, jobbers' price	9.75
Open casks, jobbers' price	10.50 to 10.75

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base, ton lots, per lb..... 32.30
Aluminum coils, 24 ga., base price 30.00

ROLLED NICKEL SHEET AND ROD

Net Base Prices

Cold Drawn Rods.....	50c.	Cold Rolled Sheet.....	60c.
Hot Rolled Rods.....	45c.	Full Finished Sheet.....	52c.

BLOCK TIN SHEET

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 12c. over N. Y. Pig Tin; 50 to 100 lbs., 18c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over.

SILVER SHEET

Rolled sterling silver (January 13) 33.25c. Troy oz. upward, according to quality.

BRASS MATERIAL—MILL SHIPMENTS

In effect January 3, 1931
To customers who buy 5,000 lbs. or more in one order

	Net base per lb. High Brass	Low Brass	Bronze
Sheet	$0.17⅜	$0.18¾	$0.19½
Wire	.17⅞	.19¼	.20
Rod	.15⅝	.19¼	.20
Brazed tubing	.24⅛	....	.29
Open seam tubing	.25¾	....	.27½
Angles and channels	.25⅜	....	.27½

BRASS SEAMLESS TUBING

22¼c. to 23¼c. net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	19¼c. net base
Muntz or Yellow Metal Sheathing (14"x48")	19⅜c. net base
Muntz or Yellow Rectangular sheet other sheathing	19⅜c. net base
Muntz or Yellow Metal Rod	16⅝c. net base

Above are for 100 lbs. or more in one order.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	25¼c.	10% Quality	28¼c.
15% Quality	27c.	15% Quality	32c.
18% Quality	28½c.	18% Quality	35½c.

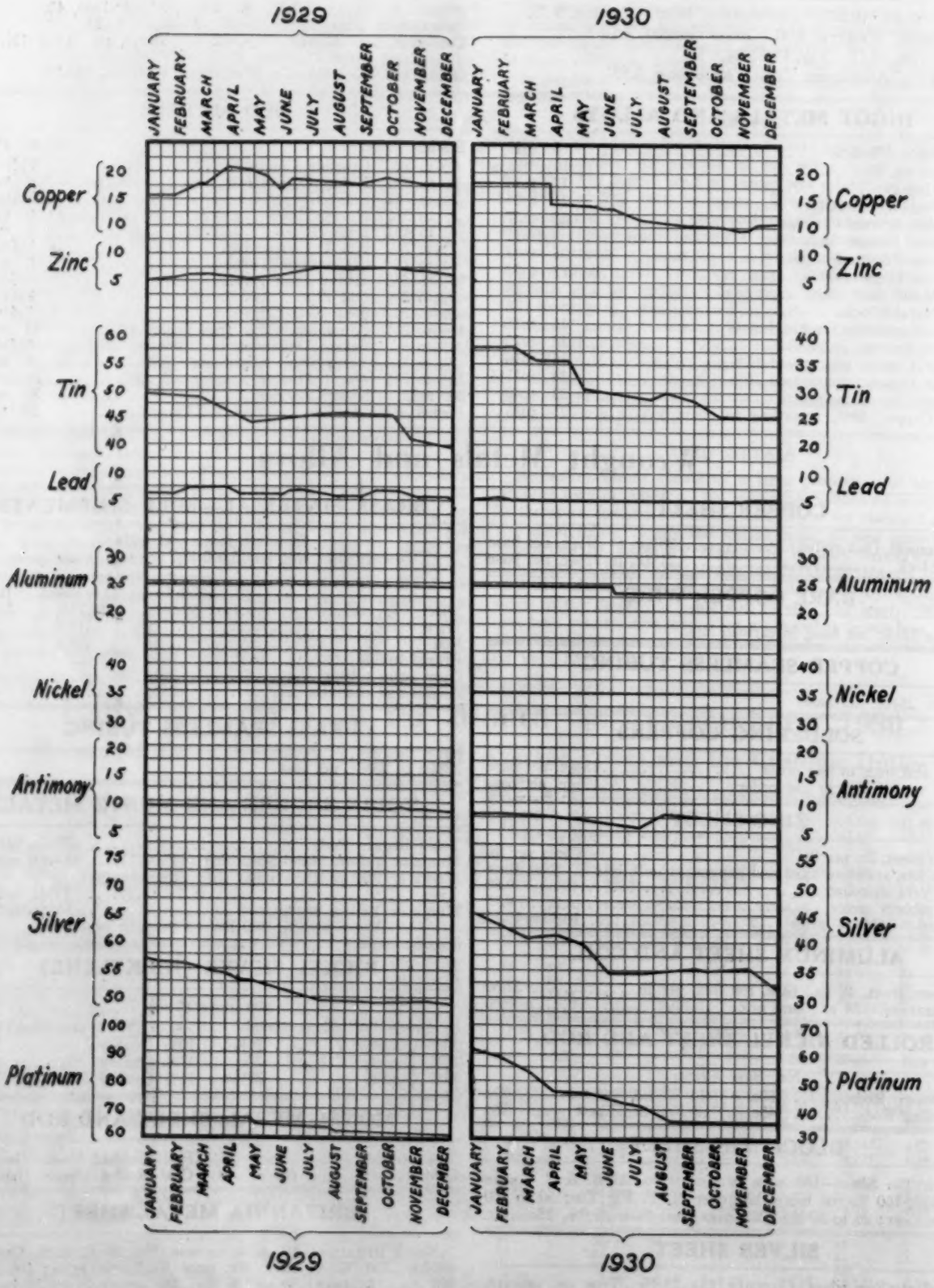
MONEL METAL, SHEET AND ROD

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 10c. over N. Y. tin price; 100 lbs. to 500 lbs., 12c. over; 50 to 100 lbs., 18c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over. Prices F. O. B. mill.

Chart of Metal Prices for 1929-1930



Supply Prices on Page 56

Pig Iron and Metal Products of the United States

Calendar Years 1921-1929. (1930 Estimated.)

(FROM THE UNITED STATES BUREAU OF MINES)

PRODUCTS METALLIC	1921 Quantity	1921 Value	1922 Quantity	1922 Value	1923 Quantity	1923 Value	Products
Pig iron (spot value), long tons	16,038,619	$389,437,792	27,670,738	$608,144,858	38,361,379	$946,799,378	Pig iron
Copper, sales value, pounds	505,586,098	65,221,000	950,285,947	128,289,000	1,434,999,962	210,945,000	Copper
Zinc, sales value, short tons	198,232	19,823,000	353,274	40,273,000	508,335	69,134,000	Zinc
Tin, short tons	4	2,400	1	912	2	1,623	Tin
Lead (ref.) sales value, short tons	398,222	35,840,000	468,746	51,562,000	543,841	76,138,000	Lead
Aluminum, pounds	55,000,000	10,906,000	74,000,000	13,622,000	129,000,000	28,305,000	Aluminum
Nickel, value at New York, short tons	111	86,000	208	133,191	100	71,605	Nickel
Quicksilver, value at S. Fran., flasks.	6,339	300,595	6,375	368,348	7,937	521,302	Quicksilver
Antimonial lead, short tons (F.&D.).	10,064	870,059	8,075	844,993	14,190	1,950,370	Antim. Lead
Silver, commercial value, troy ounces.	53,052,441	53,052,441	56,240,048	56,240,048	73,335,170	60,134,839	Silver
Gold, coining value, troy ounces	2,422,006	50,067,300	2,363,075	48,849,100	2,502,632	51,734,000	Gold
Platinum and allied metals, value at New York City, in troy ounces	56,370	4,238,989	57,718	5,932,726	49,797	5,762,305	Platinum
Total value of metallic products (approximate) (b)		$654,130,000		$987,180,000		$1,510,930,000	

PRODUCTS METALLIC	1924 Quantity	1924 Value	1925 Quantity	1925 Value	1926 Quantity	1926 Value	Products
Pig iron (spot value), long tons	31,064,129	$665,078,972	36,814,702	$739,316,333	38,181,053	$749,633,468	Pig iron
Copper, sales value, pounds	1,634,249,192	214,087,000	1,674,869,886	237,832,000	1,739,622,094	243,547,000	Copper
Zinc, sales value, short tons	515,831	67,058,000	555,631	84,456,000	611,991	91,799,000	Zinc
Tin, short tons	7	7,028	14	15,980	8	10,400	Tin
Lead (ref.) sales value, short tons	566,407	90,625,000	654,921	113,956,000	680,685	108,910,000	Lead
Aluminum, pounds	150,000,000	37,607,000	140,000,000	36,430,000	145,000,000	37,583,000	Aluminum
Nickel, value at New York, short tons	191	114,903	272	169,664	323	234,558	Nickel
Quicksilver, value at S. Fran., flasks(e)	10,085	692,739	9,174	762,616	7,642	702,323	Quicksilver
Antimonial lead, short tons (F.&D.).	20,787	3,376,713	19,667	3,785,547	22,524	3,916,714	Antim. Lead
Silver, commercial value, troy ounces.	65,407,186	43,822,814	66,155,424	45,911,864	62,718,746	39,136,497	Silver
Gold, coining value, troy ounces	2,528,900	52,277,000	2,411,987	49,860,200	2,335,042	48,269,600	Gold
Platinum and allied metals, value at New York City, troy ounces	66,007	7,611,319	49,643	5,661,809	84,981	9,210,669	Platinum
Total value of metallic products (approximate) (b)		$1,232,330,000		$1,380,280,000		$1,402,920,000	

PRODUCTS METALLIC	1927 Quantity	1927 Value	1928 Quantity	1928 Value	1929 Quantity	1929 Value	Products
Pig iron (spot value), long tons	34,866,644	$646,226,139	38,303,699	$661,351,270	41,549,161	$731,858,075	Pig iron
Copper, sales value, pounds	1,684,040,983	220,609,000	1,825,900,393	262,930,000	2,002,863,135	352,504,000	Copper
Zinc, sales value, short tons	576,960	73,851,000	591,525	72,166,000	612,136	80,802,000	Zinc
Tin, short tons	27	34,600	47	47,400	39	35,600	Tin
Lead (ref.) sales value, short tons	668,320	84,208,000	626,202	72,639,000	672,498	84,735,000	Lead
Aluminum, pounds	160,000,000	39,266,000	210,000,000	47,899,000	225,000,000	51,864,000	Aluminum
Nickel, value at New York, short tons	860	390,740	522	291,836	340	297,273	Nickel
Quicksilver, value at S. Fran., flasks(e)	11,276	1,314,782	17,870	2,207,003	23,682	2,892,638	Quicksilver
Antimonial lead, short tons (F.&D.).	24,347	3,277,043	33,058	3,978,318	25,669	3,267,095	Antim. Lead
Silver, commercial value, troy ounces.	60,434,441	34,266,328	58,462,507	34,200,567	61,327,868	32,687,754	Silver
Gold, coining value, troy ounces	2,197,125	45,418,600	2,233,251	46,165,400	2,208,386	45,651,400	Gold
Platinum and allied metals, value at New York City, in troy ounces	46,050	3,780,216	59,039	4,692,786	47,977	3,121,471	Platinum
Total value of metallic products (approximate) (b)		$1,217,000,000		$1,284,580,000		$1,476,000,000	

1930 ESTIMATED	Quantity	Value Total	Value Per Unit
Pig iron (spot value) long tons	31,500,000	$540,855,000	$17.17 ton (a)
Copper, sales value, short tons	687,500	178,502,500	12.982c. lb. (c)
Zinc, sales value, short tons	491,100	54,749,000	4.556c lb. (d)
Tin (U. S. deliveries) long tons	78,225	55,540,000	31.70 c. lb.
Lead (pig), sales values, short tons	569,000	62,683,500	5.507c. lb. (d)
Aluminum, short tons	*	*	*
Silver, troy ounces	48,637,798	48,725,552	38.154c. oz.
Gold, troy ounces	2,232,593	46,151,800	$20.67 oz.

(a) Composite, from The Iron Age.

(b) Includes some items of minor interest to metal trades not shown in table.

(c) New York. (d) E. St. Louis.

(e) For years 1920 to 1927, inclusive, mercury reported by the Bureau of Mines in flasks of 75 pounds; for 1928 and succeeding years, in flasks of 76 pounds.

* Production figures unavailable at date of issue.

Supply Prices, January 12, 1931

ANODES

Copper: Cast	21 c. per lb.	**Nickel:** 90-92%	45c. per lb.
Rolled, sheets, trimmed	18⅜c. per lb.	95-97%	47c. per lb.
Rolled, oval	18⅜c. per lb.	99%	49c. per lb.
Brass: Cast	20 c. per lb.	**Silver:** Rolled silver anodes .999 fine were quoted Jan. 13 from 33.125c per Troy ounce upward, depending upon quantity.	
Zinc: Cast	11¾c. per lb.		

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 100 lbs.	100 to 200 lbs.	Over 200 lbs.
10-12-14 & 16"	1" to 3"	$3.00/lb.	$2.75/lb.	$2.65/lb.
6-8 & Over 16	1 to 3	3.10	2.85	2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 up to 6	¼ to 3	4.85	4.85	4.85
4 up to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

Grey Mexican Wheel deduct 10c. per lb. from White Spanish prices.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

11" 20 ply 64/67 Unbleached	$17.34 to 21.48
14" 20 ply 64/68 Unbleached	25.75 to 31.89
11" 20 ply 80/92 Unbleached	21.60 to 26.75
14" 20 ply 80/92 Unbleached	31.83 to 39.42
11" 20 ply 84/92 Unbleached	28.94 to 36.59
14" 20 ply 84/92 Unbleached	40.80 to 54.29
11" 20 ply 80/84 Unbleached	26.35 to 32.63
14" 20 ply 80/84 Unbleached	39.06 to 48.38
Sewed Pieced Buffs, per lb., bleached	33c. to 79c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.11-.18	
Acid—Boric (Boracic) Crystals	lb.	.07¾	
Chromic, 75 to 400 lb. drums	lb.	.16½-.20	
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.02	
Hydrochloric, C. P., 20 deg., carboys	lb.	.06	
Hydrofluoric, 30%, bbls.	lb.	.08	
Nitric, 36 deg., carboys	lb.	.06	
Nitric, 42 deg., carboys	lb.	.07	
Sulphuric, 66 deg., carboys	lb.	.02	
Alcohol—Butyl	lb.	.16¾-.21¼	
Denatured, drums	gal.	.42-.50	
Alum—Lump, barrels	lb.	.03¼-.04	
Powdered, barrels	lb.	.04	
Ammonium chloride, solution in carboys	lb.	.06½	
Ammonium—sulphate, tech., bbls.	lb.	3.3	
Sulphocyanide	lb.	.65	
Arsenic, white, kegs	lb.	.05	
Asphaltum	lb.	.35	
Benzol, pure	gal.	.58	
Borax Crystals (Sodium Biborate), bbls.	lb.	.04½	
Calcium Carbonate (Precipitated Chalk)	lb.	.04	
Carbon Bisulphide, Drums	lb.	.06	
Chrome Green, bbls.	lb.	.24	
Chromic Sulphate	lb.	.30-.40	
Copper—Acetate (Verdigris)	lb.	.23	
Carbonate, bbls.	lb.	.17½	
Cyanide (100 lb. kgs.)	lb.	.41	
Sulphate, bbls.	lb.	4.70	
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.27	
Crocus	lb.	.15	
Dextrin	lb.	.05-.08	
Emery Flour	lb.	.06	
Flint, powdered	ton	$30.00	
Fluor-spar (Calcic fluoride)	ton	$70.00	
Fusel Oil	gal.	$4.45	
Gold Chloride	oz.	$12.00	
Gum—Sandarac	lb.	.26	
Shellac	lb.	.59-.61	
Iron Sulphate (Copperas), bbl.	lb.	.01½	
Lacquer Solvents	gal.	.85	
Lead Acetate (Sugar of Lead)	lb.	.13¼	
Yellow Oxide (Litharge)	lb.	.12½	
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58	
Nickel—Carbonate, dry bbls.	lb.	.32	
Chloride, bbls.	lb.	.20	
Salts, single, 300 lb. bbls.	lb.	.10½	
Salts, double, 425 lb. bbls.	lb.	.10½	
Paraffin	lb.	.05-.06	
Phosphorus—Duty free, according to quantity	lb.	.35-.40	
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.083	
Potassium Bichromate, casks (crystals)	lb.	.09¼	
Carbonate, 96-98%	lb.	.06¼-.07	
Cyanide, 165 lb. cases, 94-96%	lb.	.57½	
Pumice, ground, bbls.	lb.	.02½	
Quartz, powdered	ton	$30.00	
Rosin, bbls.	lb.	.04½	
Rouge, nickel, 100 lb. lots	lb.	.25	
Silver and Gold	lb.	.65	
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05¼	
Silver Chloride, dry, 100 oz. lots	oz.	.29¾	
Cyanide (fluctuating)	oz.	.42-.42½	
Nitrate, 100 ounce lots	oz.	.26	
Soda Ash, 58%, bbls.	lb.	.02½	
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½	
Hyposulphite, kegs	lb.	.04	
Nitrate, tech., bbls.	lb.	.04¾	
Phosphate, tech., bbls.	lb.	.03¾	
Silicate (Water Glass), bbls.	lb.	.02	
Sulpho Cyanide	lb.	.32½-.42½	
Sulphur (Brimstone), bbls.	lb.	.02	
Tin Chloride, 100 lb. kegs	lb.	.32	
Tripoli, Powdered	lb.	.03	
Wax—Bees, white, ref. bleached	lb.	.60	
Yellow, No. 1	lb.	.45	
Whiting, Bolted	lb.	.02½-.06	
Zinc, Carbonate, bbls.	lb.	.11	
Chloride, casks	lb.	.06¾	
Cyanide (100 lb. kegs)	lb.	.41	
Sulphate, bbls.	lb.	.03½	